The Chemical Age

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Safeguarding British Glass Makers

THE first inquiry under Part II. of the Safeguarding of Industries Act—the part designed for the prevention of dumping—was opened in London on Monday. It relates to a complaint by the British flint glass manufacturers of unfair competition from foreign makers, and an appeal that competitive foreign products should be subjected to the duty provided for in the Act. The procedure is somewhat different from that adopted under Part I. The complaint is heard by a committee instead of by a referee, and the committee have adopted two useful rules. The first is, while treating the inquiry as open to the public, to reserve the right to hear such parts of the evidence as they think fit in committee. The second is to allow witnesses to be accompanied by counsel or solicitors, but not to allow examination or cross-examination except through members of the committee. These rules should afford some protection to witnesses against the rather terrifying array of counsel these inquiries threaten to attract.

Without attempting to prejudge the case, it may be said at once that the evidence abundantly justifies a *prima facie* examination. It is clear that when foreign supplies of glass were cut off by the war, British firms made a patriotic and to a large degree successful effort to supply the deficiency. They laid down new plant at considerable expense, extended their staffs, and developed their processes of production. They appeared to be well satisfied with the results until, after the Armistice, foreign goods came freely into this country at much lower prices. The result is that some new works have been closed and others are threatened, and that unemployment has reached serious dimensions.

An essential point in the complainants' case is that their outlay and extensions during the war were undertaken under pressure from the Government, and on the understanding that after the war they would be reasonably protected against unfair foreign competition. One witness was asked whether any assurance to this effect was given in writing. It is quite unlikely that any such documentary assurance would be asked for or given. At that stage of the war people trusted one another's honour to an unusual extent, and when Government officials, whose one concern was to get things done, assured those whom they appealed to that they need have no fear of being let down, the disposition was to accept such assurances in complete good faith. Such negotiations, if equity is to be observed, must now be treated in the light of the atmosphere in which they were conducted, and not in the spirit of the Statute of Limitations. We have no doubt at all that the country desires the pledges given in its name to be faithfully kept, and the Act was passed as a guarantee.

In the course of the hearing some interesting points were brought out. Generally speaking, the British firms agree that the inequality of exchange is largely responsible for the present position, and that a tax of one-third the value on foreign goods would substantially help them to hold their ground. It is satisfactory, too, to hear of the loyalty with which British firms who use glass have supported home productions, even at prices a little higher than those of foreign goods, and of the high quality of British glass. Figures were quoted to show that the cost of replacement in the case of glass for public lighting produced by Chance Brothers was represented by the figure 0.64 as against a cost of 2.27 in the case of German glass. The case laid before the committee is certainly one for sympathy, and if something can be done to save these new British industries from extinction it will be very good work.

Two Decisions against the Board

THE first two inquiries under Part I. of the Safeguarding of Industries Act have ended in decisions against the Board of Trade. Santonine, which the Board included in its list of dutiable articles, and which it made a strenuous fight to retain there, is to be struck off altogether. In the case of gas mantles, which the Board of Trade excluded from its list, the referee has not, it is true, ordered their inclusion *qua* mantles, but he holds that the thorium and cerium compounds contained in mantles should be included as taxable, and as these compounds virtually constitute the mantle when in use, the decision here again, in substance, is against the Board.

The referee responsible for these decisions is a competent lawyer, appointed to determine such disputes on the nomination of the Woolsack. It may be assumed, therefore, that he is capable of construing the terms of an Act of Parliament, of weighing evidence, and of deciding between the conflicting theories of the experts. His reading of the Act appears to differ fundamentally from that of the Board of Trade. The primary purpose of the Act is to safeguard industries. What industries? Obviously, industries actually carried on or immediately in prospect of being carried on in this country. The referee has taken the Act to mean just what it says and nothing else, and has refused to import into it the spacious political policy conceived by the higher minds at the Board of Trade. The Board has taken the decisions none too well, though they cast no discredit really on the able and painstaking chemists who have prepared the lists, and whose work in some detail or another was sure to be challenged. They are, however, a reminder to the Board that it is not infallible, and that in this case its ambition to dictate a national policy has seriously overrun the boundaries of its departmental functions.

Two general points of considerable interest were raised in discussion following the announcement of the referee's decisions. The first relates to costs. The referee has declined in the two cases so far decided to allow costs to either side. That decision is welcome, as tending to make such appeals as simple and inexpensive as possible, and to prevent the poorer parties from being swamped by the richer. The second point is still more important. The referee has obviously no sympathy with the veiled threat of the Board of Trade to subject his decisions to the tedious and costly process of appeal up to the House of Lords stage. Nor would the public sympathise with it, and if the Board persisted Parliamentary action on the point would, we imagine, be prompt and emphatic. The Act definitely provides that the decisions of the referee shall be final, and the Board should set an example by loyally accepting them. In the present state of national finance, the country is not disposed to see huge sums spent in briefing distinguished counsel to save the Board's dignity.

May one word of caution be added to those who have never accepted the principle of the Act and who may be inclined to exploit these decisions for political ends? The referee's decisions, it may be presumed, will amend the official list of dutiable articles from time to time, but such amendments are merely matters of detail and do not touch the Act itself. The measure is an attempt to keep faith with British manufacturers who did their duty to the nation during the war. We do not think any movement to break faith with them would find general support, and if those who suffer inconvenience from the Act seek relief in an alliance with a political movement for its repeal the result may be to prejudice the position of the trader with genuine trade grievances.

Engineer and Chemist

IN America recently Dr. L. H. Baekeland, an honorary professor of chemical engineering at Columbia University, had some pertinent, though caustic, remarks to make about the ineptitude of the average chemist as an engineer, and *vice versâ*. The theme is by no means a new one; and, even though it may be getting a little hackneyed, it bears repetition at intervals if only as a gentle reminder that most of the progress made in developing the perfect chemical-engineer has so far been on paper. Dr. Baekeland tells us that there still seems to be a good deal of obscurity as to the exact relation of the chemist to the engineer, and he points to the fact that the experience of many a scientist has been confined exclusively to laboratory work or to purely chemical subjects. This is usually the reason of his weakness in dealing with practical matters, for he is inclined to restrict his point of view too much to that part of the problem with which he is confronted. Thus he is apt to neglect other considerations which—although seemingly unimposing from a scientific standpoint—frequently carry with them the very elements of success or failure in practical applications. In fact, many a chemical reaction, brilliantly successful in the laboratory so long as the operation could be limited to a small scale, has been doomed to failure when attempts were made to run it on a permanent commercial scale.

It does not seem to be fully appreciated that before even the laboriously gathered knowledge of the laboratory can be utilised there is a vast amount of further methodic work to be performed. It is usually at this stage that the engineering mind finds its uses, and it has yet to be recognised that the way of thinking and acting as a chemist and as an engineer is usually along decidedly different points of view. Accordingly, good chemical engineering can only result if these points of view are compromised or harmonised. The pure chemist, confined by the walls of the laboratory and library, frequently fails to exercise sufficiently the sense of proportion. Nor are engineers as a class free from being carried away by a one-sided point of view, although their way of reasoning and grappling with a problem is usually more along quantitative considerations. The problem of producing the ideal combination is undoubtedly a difficult one. Perhaps the best reply one can give when taunted with failure is that life is short and art—particularly when chemistry and engineering are concerned—is long, and that probably no single individual will ever succeed in attaining omniscience in both of these sciences.

Action of Oil on Concrete

A READER who is interested in the storage of oil in bulk is anxious to know the experience of those who have, under fairly prolonged practical conditions, been associated with storage in reinforced concrete tanks. In this country the steel tank has been generally favoured, and consequently there is a paucity of reliable published information as to the action of oils on concrete. So far as our own knowledge of the matter goes we may say that the most comprehensive study which has been made in connexion with the problem has been conducted by the German Concrete Association, who seem to have arrived at conclusions of considerable importance. The position, as it stands at present, seems to be that concrete is more or less unaffected by the majority of mineral oils, but in the case of those of vegetable and animal origin there is some likelihood of injury resulting owing to the presence of acids. Whatever the product to be stored, however, it is considered desirable to line the interior of the tank with an impervious material which will preclude the oil—even though it contains no injurious constituents—penetrating the pores of the concrete. The German investigators do not recommend asphalt or kindred linings, as these are frequently soluble in oil. A more reliable method is to impregnate the surface skin of the concrete with a solution of a suitable mineral salt such as silicate of soda. Such a salt will then combine with the alkaline constituents of the cement so as to form insoluble products which will constitute an impenetrable screen.

Professor Marcassin, who has conducted tests at Lichterfelde, claims to have discovered a medium for lining which is entirely unaffected by oils whether they be of animal, vegetable, or mineral origin. The lining in question is composed essentially of "Margalite"—an artificial resinous substance resulting from the condensation of formaldehyde with phenol. This is a rapidly-drying substance which may be painted on the interior of the concrete, and the tank so treated is ready for the reception of the oil a few hours after the oil-proofing paint has been applied. It is as well to remember, of course, that in this country there are a number of reliable preparations for treating concrete which are sold under trade names. For the most part their primary duty is that of "water-proofing," but in many instances they are, no doubt, also impervious to oil.

Chemical Trade with Russia

OUR Berlin correspondent reminds us that the interest of continental nations is at present concentrated on Russia, and on the commercial opportunities that must arise when Russian markets are reopened to international trade. Although the foreign boards of trade established by the Soviet Government have failed completely owing to lack of money, a considerable volume of trade, our informant states, is even now carried on unofficially, and with the tacit approval of the Russian authorities. This is done mainly by a group of pedlars who manage to smuggle the goods over the frontier, and these, in Central Europe at least, are regarded as the harbingers of legitimate business.

Contrary to many reports the Russian people, especially the peasant class, have retained considerable wealth, in spite of the efforts of the Bolshevist authorities to capture it. The peasants, who are urgently in need of all classes of commodities, are therefore able and willing to pay almost any prices asked. This is true especially of chemical and pharmaceutical preparations, which on account of the prevalence of epidemics are in great demand. The first traders to benefit from these conditions were the Scandinavians who shortly after the war established warehouses at Reval and secured enormous profits. They were presently, however, according to German information, "dispossessed by clever British business men who were far-sighted enough to monopolise the trade by controlling the three main harbours—Reval, Riga, and Helsinki." Lately, they have been meeting with keen competition from German firms, who are availing themselves of German business men familiar with Russian conditions from many years' experience. The position is summed up in our Berlin correspondent's remark that "the extensive local knowledge and experience on the German side and the overwhelming financial power of the British on the other side make the issue of this business struggle extremely doubtful but intensely interesting."

Points from Our News Pages

The inquiry in the complaint of the British Cellulose Company and British Carbide Factories that calcium carbide is improperly excluded from the Board of Trade's list of dutiable chemicals under Part I. of the Safeguarding of Industries Act was opened on Saturday last, and will be resumed to-day (p. 764).

The Referee under Part I. of the Safeguarding of Industries Act has decided that santonine is wrongly included in the list of dutiable chemicals, and that "mechanical compounds of nitrate of thorium and cerium, and oxides of thorium and cerium in the form of mantles or forming part of mantles used in incandescent gas lighting are dutiable" (p. 762).

The first inquiry opened on Monday under Part II. of the Safeguarding of Industries Act relates to complaints by British glass companies (p. 765).

Reviews are published of Thorpe's "History of Chemistry," Holleman's "Text-Book of Inorganic Chemistry," Kingzett's "Popular Chemical Dictionary," and Hazell's "Costing for Manufacturers" (pp. 758-9).

Our correspondence includes letters from Dr. P. Schridrowitz, L. Cerrutty (Melbourne), W. R. Fairbrother (London), and A. G. Gosling (Newfoundland) (pp. 759-60).

The Board of Trade returns for November indicate increases in imports and decreases in exports of chemicals and drugs. (p. 769).

Additional appointments to the permanent panel formed in connexion with the Committees appointed under Part II. of the Safeguarding of Industries Act are notified (p. 771).

Officers of the proposed Institution of Chemical Engineers have been appointed (p. 768).

In a lecture at Newcastle-on-Tyne, Dr. W. B. Davidson exhibited a new CO_2 recording instrument known as the "Katharometer" (p. 768).

The demand for chemicals continues fairly brisk, and prices are well maintained (p. 776).

The Calendar

DEC.		
19	Chemical Industry Club: "The Making of a Mirror." Dr. W. R. Ormandy. 8 p.m.	2, Whitehall Court, London.
20	Hull Chemical and Engineering Society: Informal Discussion. 7.30 p.m.	Wilberforce Café, Waterworks Street, Hull.
20	Safeguarding of Industries Act: Glassware Committee. 2.30 p.m.	Hotel Windsor, London.
20	Sheffield Association of Metallurgists and Metallurgical Chemists: "The Effect of Solders on Beta Brasses." J. H. Dickenson.	31, Rossington Road, Brocco Bank, Sheffield.

Reviews

HISTORY OF CHEMISTRY. By SIR EDWARD THORPE, C.B., LL.D., F.R.S. Watts & Co. (for the Rationalist Press Association, Ltd.). Pp. 152. 7s. net.

This book is comprised of two small volumes. Vol. I. (pp. 148) deals with chemistry from the earliest times to the middle of the nineteenth century. Commencing with the chemistry of the ancients and their chemical philosophy, it traverses the period when man began to see visions of the truths of physical science, when Robert Boyle published his classical work "The Sceptical Chemist" (1661). The Phlogiston Theory, Lavoisier's great work, and the development of Dalton's Atomic Hypothesis constitute other chapters, followed by the development of physical chemistry and electro-chemistry, and the foundation of organic chemistry.

Vol. II. (pp. 152) spans the period from 1850 to 1921, commencing with a review of the state of chemical knowledge in the middle of the nineteenth century. Subsequent chapters deal with the elements discovered since 1850, and the inactive elements, radium and radio-activity. It is of interest to note in connexion with the discovery of the inactive elements Julius Thomsen's paper on "The Probability of the existence of a group of Inactive Elements" (1895) based on the periodic change of properties of the elements then known from negative to positive values, from which he argued the existence of a group of elements of zero activity. Other chapters are devoted to atoms and molecules, the molecular theory of gases (including liquefaction and low temperature researches), periodic law, valency, and a concluding chapter on the development of physical chemistry since 1850.

It is to be regretted that the author has not found a place for the recent work on isotopes, and the important bearing of the definite establishment of the atoms of some elements having different atomic weights, in conjunction with the disintegration of atoms, on to-day's views of the nature of the atoms, the conception of valency, and the significance of atomic numbers. One is left rather with the idea, resulting from Stas's great work, that the elements are "each a primordial and unalterable substance." Sir Edward Thorpe's book requires one more chapter, and this he has provided elsewhere in the masterly summary of modern views of the nature of the elements, the atoms and valency in his presidential address to the British Association this year.

The history is written with that clearness of diction and charm of style which characterise Sir Edward's writings, and will appeal not only to chemists but to the large intelligent public specially catered for by the Rationalist Press Association.

J. S. S. B.

TEXT-BOOK OF INORGANIC CHEMISTRY. By PROFESSOR A. F. HOLLEMAN, translated by H. C. COOPER. New York: John Wiley & Sons; London: Chapman & Hall. Pp. 513. 19s.

This is an excellent book, and has already reached six editions. There seems to be no reason why it should not attain to half a dozen more. It has been written by Professor Holleman, of Amsterdam, and translated, revised, and partly re-written by Professor Cooper, of New York. The co-operation of these two has resulted in a highly readable book of about five hundred pages, printed in agreeable and plain type, and with a sufficient index and a few illustrations. Scattered throughout the work are valuable articles, on the whole well up to date, on the Atomic Theory, Stoichiometry, Dissociation, Thermo-chemistry, the Periodic System, the Phase Rule, Colloids, Radio-activity, and other features of theoretical chemistry. The authors adopt an order of their own which the reviewer found to be a pleasant change from the conventional order. It seems to be wholly illogical; thus they treat of oxygen, then hydrogen, water, chlorine, ozone, hydrogen peroxide, bromine, iodine, fluorine, sulphur, and so on. But each part is well done, and if any readers are offended by this touch of anarchy they will be speedily restored to good humour by the excellence of the parts and can mentally rearrange the book if they think fit. The authors have found the golden mean between brevity and fullness, and exercised a wise discretion as to what facts to insert and what to omit. It is hard in this country to judge what style will satisfy the American reader, but English readers will think that the style, which on the whole is good, is occasionally marred by awkward phrases. For instance, "The aqueous solution of ammonia acts strongly basic"; and Methane "is called 'fire damp' because it occurs in coal beds, from which it escapes when they are broken up." The account of the smelting of lead ores is not good. Galena, as the ore is called here, not galenite, is often smelted without the addition of silica and not invariably in a blast furnace. And it is hardly accurate to say, "When lead is melted it becomes coated with red oxide of lead." It can be melted in such a manner and in contact with air so as to produce litharge and some litharge is red. But this is a different statement. The use of the old-fashioned word "metalloid," meaning like a metal, to denote the opposite to a metal is a pity, and we think the word might be allowed to sink into oblivion and be replaced by non-metal. The work of Dr. Aston on isotopes could with advantage have been referred to. But the fact remains we are glad to have read the book and shall do so again.

M.

THE POPULAR CHEMICAL DICTIONARY. By C. T. KINGZETT, F.I.C. Second Edition. London: Ballière, Tindall, & Cox. Pp. 539. 21s. net.

It must be a source of considerable gratification to the author of this handy little volume to find that a second edition was demanded only some eighteen months after the publication of the original edition. As compared with its predecessor, the new volume has undergone considerable enlargement, but the remarks made in these columns in connexion with the first edition may still be said to apply to its successor. It was then emphasised that Mr. Kingzett's collection of material does not in any way bear comparison with the famous dictionaries of Watts and Sir Edward Thorpe, nor does it pretend to fill the same place, but it is the type of ready reference which the busy man—particularly if his memory is indifferent—would do well to keep on his desk. Unfortunately, many chemical processes are so involved that attempts to condense them into "potted" form must invariably result in failure to describe them lucidly. On the other hand, if prolonged descriptions are to be applied to so immense a subject, it involves running into a series of portly volumes—and then the information is not portable. So far as the reference library is concerned there is perhaps a good deal to be said for the system of including both the "magnum opus" and the handbook, the former constituting a complete fount of knowledge to be studied *in situ*, and the latter proving a helpful *vade mecum* or travelling companion to be consulted at any odd moment when one's memory begins to play tricks. As representative of the two classes of references one might, then, place Sir Edward Thorpe's work in one category and Mr. Kingzett's in the other.

In the review of the original edition the opportunity was taken to refer to the rather sketchy description of some of the most important chemical developments. It is pleasing to note that in the new volume considerably more space has in most cases been accorded these. Instead, for instance, of the four-line description of the Haber process, one now finds some eight pages given to the subject of nitrogen and its compounds, and room is found for mention of the work of Claude, Häusser, and Ostwald. In fact, even the Cobb process for the direct recovery of sulphate of ammonia by utilising zinc sulphate receives its share of attention. It is noticeable that the author does not exclude trade names, although the description of proprietary articles, such as "Sanitas," might with advantage be a little more illuminating.

C. A.

COSTING FOR MANUFACTURERS. By W. HOWARD HAZELL. London: Nisbet & Co., Ltd. 12s. 6d.

The war has given us quite a literature of costing. The Ministry of Munitions set up the most elaborate machinery for arriving at the cost of the products that it needed, and, at the same time, created a large class of costing experts, several of whom have since put their experiences into print, and given to the world their ideas on the science of costing. The volume now published from the pen of Mr. W. Howard Hazell, under the above title, will, therefore, be the more welcome because the author can speak on these matters with an authority greater than that of most writers. Mr. Hazell is not only the Vice-President of the Institute of Cost and Works Accountants, but was the author of the costing system now universally used by printers, and has, for many years past, been recognised as one of the greatest living experts on this vital subject. Mr. Hazell's writings have, hitherto, been confined to costing as applied to printing, and we do not doubt that the larger view which he takes in the present volume, addressed to manufacturers as a whole, will find a ready acceptance. The volume under review discusses very briefly the general principles underlying a true costing system and then dives into detail. The essential features of costing are discussed one by one, and practical advice on the ascertaining, and collecting, and application of costing figures is given under appropriate headings. The matter is copiously supported with diagrams, and specimen accounts, while models for seventeen different forms appear as appendices.

It is, perhaps, not surprising that so high an authority on the practice of costing should fail in a curious and remarkable way to understand the true purpose of the art which he is teaching. The naval expert is not a good judge of a peace policy, and the general staff will not, as a rule, take the sanest view on the question of disarmament. So it is with the costing expert—he becomes so absorbed in the fascination of his own subject as to miss its true relation to things in general. In his preface Mr. Hazell says: "A business is carried on with the intention of charging to the customers the total cost of producing the goods, to which should be added a reasonable profit." Surely this is the error which has wrecked so many businesses within the last few years. It is certainly the error which is responsible for the appalling amount of unemployment among printers. The real fact is, of course, that a business is carried on with the object of producing goods at a price which the public will readily pay—a very different purpose from that enunciated by Mr. Hazell. The latter definition makes a costing system far more important, and puts it on to a higher plane than Mr. Hazell appears to understand. A costing system properly used will enable a manufacturer to discover new ways of reducing costs and thus open up to him ever-widening markets.

But our little quarrel with Mr. Hazell on this rather subtle point does not minimise by one whit our admiration for the masterly way in which he deals with the subject of costing, nor does it detract in the least from the high value of the technical information which he imparts to the reader in this very welcome volume. The modern manufacturer must have a costing system—that is agreed—and no one can help him in the matter better than Mr. Hazell. When he has got his costing system economic pressure will teach him how to use it, and may in time cause even Mr. Hazell to modify his view as to the real intention with which business is carried on.

B.

Sir Samuel Hall Chair of Chemistry

PROFESSOR H. B. DIXON, C.B.E., M.A., M.Sc., Ph.D., F.R.S., has intimated to the Council and Senate of Manchester University his intention to retire from the Sir Samuel Hall Chair of Chemistry at the end of the present session. Professor Dixon, who is an authority on explosions of gases, was appointed to the professorship in 1886, in succession to Sir Henry Roscoe. His special knowledge and experience of the subject led to his appointment in 1891 to the Royal Commission on the explosion of Coal Dust in Mines, and also to the post of Deputy Inspector of High Explosives for the Manchester Area during the war.

"A Revolution in Rubber Technology"

To the Editor of THE CHEMICAL AGE.

SIR,—I was much interested in the communication under the above heading with reference to the Plauson Mill, published in your issue of December 3, and, assuming that the effects produced are as described, may I enquire whether your contributor can give any information as regards prime cost of unit, power consumed, and depreciation, in comparison with ordinary mills such as are used for grinding rubber drugs. One would assume, *a priori*, that exceedingly fine grinding would involve high-power consumption and depreciation factors, but I am merely enquiring—not criticising.

With regard to the statement that rubber itself can be ground to a fineness of 0.001 to 0.00001 mm., I am not quite clear what this may mean. Rubber is not "ground" in the ordinary sense at all; in fact, consonant with the obtaining of a sufficient degree of plasticity, the less rubber is worked the better. Perhaps your contributor will enlighten us on this point also.—I am, &c.,

P. SCHRIDROWITZ.

The Chemical Laboratory, 57, Chancery Lane, W.C. 2.
December 12.

Acid Concentration

To the Editor of THE CHEMICAL AGE

SIR,—The issue of THE CHEMICAL AGE, dated August 13, 1921, which has lately reached the Antipodes contains some interesting calculations by F. C. Sutton dealing with the subject of acid concentration.

Certain points in the author's argument appear to be questionable, however. For the purpose of analysing the problem conveniently, Mr. Sutton assumes that concentration takes place in a series of stages in each of which the following operations take place:

1. Acid is raised in temperature.
2. H_2SO_4 and H_2O separate to some extent.
3. H_2O is volatilised.

Disregarding any variations in the performance of external work due to the order of the operations, it is clear that the latent heat of volatilisation of water will vary and that the assumption of 537 as a constant for all temperatures from 15° to 280° is inaccurate. If the approximate formula (599 - .6t°C) be used instead, the maximum latent heat figure becomes something like 430. Now the heat required for volatilisation, 24,750 B.T.U., is more than 50 per cent. of the total 46,890 quoted in table III. and used later on p. 180, so that the gradual and considerable decrease of the latent heat figure makes the total B.T.U.'s, 46,890, much too great.

A minor point on which a cautious estimator might differ from Mr. Sutton lies in his choice of specific heat figures in calculating the sensible heat required. Would it not be safer to take, say, the mean specific heat over each range of temperature rather than the lowest value, *i.e.*, for the highest temperature in that range? A difference of 3 per cent. in this figure would make an error of at least 1 per cent. in the total heat, probably more if the volatilisation total be amended.

This percentage is, however, trivial compared with the 20 per cent. allowed for volatilisation of acid, radiation loss, &c., on p. 180. Many of your readers would be glad to know of actual cases where a heat balance has been arrived at for a specific plant. It was demonstrated in North Wales that a modern cascade concentrator returned a thermal efficiency of under 25 per cent., losses of heat due to volatilisation and dissociation of sulphuric acid, thermal content of exit gases and of acid, and radiation, accounting for the remainder. While the Gaillard tower is, of course, much more efficient than a cascade, the surprisingly high thermal loss demonstrated in the case quoted might make one suspect the sufficiency of a 20 per cent. margin. With fuel and maintenance accounting for at least 50 per cent. of the cost of concentration a difference of even 10 per cent. in the margin allowed in estimating represents a considerable item in these days of economy and close competition.

An attempt to estimate the heat required for concentrating sulphuric acid was made by Professor Porter, and his argument, as recorded in the Transactions of the Faraday Society, June, 1918, is probably the best yet published. Verification of the Professor's figures, by testing an actual plant over a period, involves that most difficult operation of directly measuring radiation losses. Until this can be done accurately

one would imagine it the safest course to found one's estimates of plant capacity on the performances of towers in actual operation rather than on table No. III.—Yours, &c.,

Caulfield, Melbourne, October 31. L. CERUTTY.

Trade Depression and Income Tax Relief

To the Editor of THE CHEMICAL AGE.

SIR,—From the many accounts appearing in the Press, it is obviously hoped that the Chancellor of the Exchequer will endeavour to lighten the burden of taxation in the near future. May I, therefore, suggest what, in my opinion, would prove beneficial in furthering the efforts to revive the nation's trade? The repeal of the well-known and helpful sections 43 and 44 (which gave relief when profits or income had diminished in any year of assessment) as and from the year 1920-21, is now clearly seen to have been a mistaken policy. Had such relief been continued over the period of the war's "aftermath," the present acute depression might have been to some extent averted, and trade in the reconstruction period would not have been so injuriously and adversely hit by such high taxation.

I would, therefore, urge that these two sections be re-enacted and made retro-active as and from the year 1920-21, which would have the effect of (1) allowing firms and companies an amended assessment based on the lower profits, and (2) giving an individual the basis of actual income instead of the higher statutory assessment.—Yours, &c.,

W. R. FAIRBROTHER.

67-68, Cheapside, London, December 12.

Hydrogenation of Fish Oils

To the Editor of THE CHEMICAL AGE.

SIR,—The writer saw a copy of your paper, THE CHEMICAL AGE, in the St. John's, Newfoundland, Board of Trade, and noticed a statement to the effect that you would be glad to receive enquiries on chemical matters.

The writer is very anxious to receive any information with reference to the hydrogenation of fish oils similar to the processes that have been carried on in Norway for some years past, and if your readers could give him any practical information or put him in touch with any firm who may be turning fish oils into edible oils in England, he would be very grateful.—Yours, &c. A. G. GOSLING.

St. John's, Newfoundland, November 24.

Who Pays the Reparations?

By C. H. Hughland

NINE weeks ago, on October 10 to be exact, I bought in Berlin an article which cost 1,200 marks, and paid for it in German currency. I explained to the clerk who served me that the charge should be 1,200 marks less 26 per cent. in accordance with the reparation arrangements now in operation, but as he professed to understand nothing of this and insisted that the price he was instructed to charge was 1,200 marks, I did not stop to quibble over the matter, paid my bill, took a receipt, and gave instructions that the goods should be forwarded to my address in London.

I had almost forgotten the transaction when, on November 14, I received from H.M. Customs and Excise a printed document (informing me that the goods had been received on November 8), a lengthy form which was to be filled up in duplicate, and a copy of Notice No. 71 under the German Reparation (Recovery) Act, 1921, containing 2,000 words. Having read the 2,000 words once rapidly to get the general sense of it, and a second time very carefully in order to grasp the numerous details, I filled in the forms and took them, as instructed, to the office of a collector of customs and excise in the E.C. district, hoping to hand over the amount due and to receive the small parcel.

An official at the office in question treated me with the utmost courtesy, read through the forms which I had filled up, and placed his signature on them. I confess I do not know quite what the process was, but I gathered in a vague way that he was attesting the papers. He then informed me that if I would take the documents to the parcels office at Mount Pleasant, I should be able to hand over my money and get my goods. The Customs House and the Parcels Office are a couple of miles apart, but I eventually found the room in the enormous building at Mount Pleasant in which my business could be dealt with. There were about forty people there, and on the right a counter at which folk, apparently on the same quest as myself, were handing over papers and money. I had to wait until a dozen had been dealt with, and then handed my papers to the clerk, who asked me if the papers had been checked. I said "no," but that they had been attested. He pointed to a queue in which about twenty-five people were waiting, and told me to get them checked. After a weary three-quarters of an hour of waiting, my turn came. I presented the documents to the official who was dealing with them (with the utmost expedition be it said). He looked them through, made one or two marks in red ink (which I could not read), and told me that if I would come back in about an hour, or any time during the afternoon before four o'clock the matter could be dealt with. I had started out on this little piece of business about 11.30, and it was now after one o'clock, and I decided that it would be an opportune time to get some food and then tackle it again. Fortified for fresh endeavours I reached Mount Pleasant again at 2.30, and seeing that I had already stood in the queue once I decided that I would dispense with that formality, and going straight up to the official, said: "You have seen these papers once; can they now be dealt with?" He immediately pointed me to a table in a large office at which a clerk checked the figures which he apparently found in order, and I once more imagined that my troubles were at an end. The next process, however, was to approach yet another clerk sitting at another table, who proceeded (on a very beautiful piece of paper surmounted by the Royal Arms) to make out a receipt for the few shillings which I was paying out of my own pocket towards the German reparations.

Having now got a receipt, I returned to the counter to hand over my papers and the money. Having stood in another queue, I again made an attempt to pay, when the official inquired: "Had I made out a chit?" What this new form of entertainment was I had not the least idea, but I at last found on a table some little brown slips of paper on which I was supposed to set down the exact amount of money handed over, the exact amount of the payment, and by subtracting one from the other to set down the exact amount which I was to receive in the form of change—in this particular case amounting to 2d.

Now with a handful of papers, consisting of (1) the original invoice; (2) a copy of it, as instructed by Notice No. 71.; (3) Notice No. 71 itself; (4) the original notice from the Customs Department; (5) forms made up in duplicate; (6) the receipt aforesaid, headed with the Royal Arms; and (7) the chit showing the amount of change, I made a third frontal attack on the counter. This time the clerk actually took my money and handed me the change. I then asked meekly where and when I could get my parcel. He told me that if I would go out of the door, down the stairs into the yard, turn to the left, go along a curious little passage to the back of the building, up some more stairs to room No. So-and-so, I could get a stage further with it. Strange as it may appear, I found that room, and in it about a dozen rather blasphemous men who had each of them submitted to the exasperating processes which I had just gone through. But I felt that I was at least getting nearer my parcel of goods, and took my place in the queue. When my turn came and my papers were handed in, I was given in exchange for them what I gathered was called a release ticket, and I was politely informed that if I would present this at the South-Eastern Parcels Office, Union Street, London, S.E.1, I could have the goods. And so down Farringdon Road I went, through Ludgate Circus, down New Bridge Street, across Blackfriars Bridge, and half a mile on the other side to Union Street, then up some more stairs to present my release ticket.

The irony of all this is that the payment made after such an exhausting struggle is not paid by the German customer at all—every halfpenny of it is paid by me.

As far as I am able to understand the position in respect of the transaction described above I pay not only 26 per cent. but considerably more than 26 per cent. on my original purchase price, and the German Government undertakes to repay to the exporter in Germany a sum to which he is in no wise entitled, as he has already received from me the full value of his goods.

Barium Minerals

Statistics of Production and Consumption

A DIGEST of statistical and technical information relative to the production and consumption of barium minerals between 1913 and 1919 has been issued by the Imperial Mineral Resources Bureau, and is obtainable through H.M. Stationery Office, price 9d. net.

Dealing with the preparation of barytes, the report refers to German practice, which, in the preliminary crushing, is to nut size. The fine grinding preliminary to bleaching is done by heating the crushed mineral with dilute crude sulphuric acid (commonly one of acid to three of water) to remove oxides of iron, calcium, manganese, &c. The process was formerly conducted in stone tanks, but in modern plants lead-lined wooden or steel vats are employed, the heating and necessary agitation being usually effected by passing steam into the sludge through a perforated lead coil. In some plants the agitation is performed by mechanical stirrers. When the soluble impurities have been completely removed, the solution is drained from the vat and the sludge is leached with water until free from acid. The mineral, after drying, is then in condition for the extremely fine grinding that is essential for its use in the paint trade.

The world's production of barium minerals was 157,972 tons in 1913, and after dropping to 130,230 tons in 1914 reached a total of 320,577 tons in 1916. This declined in 1917 to 293,365 tons, and in 1918 to 232,087 tons. The 1919 production showed a recovery at 270,808 tons. In the first two years of the period under review the United Kingdom was the largest producer, with the United States second, and Bavaria third. From 1915 onwards, however, the United States has held the first place, with the United Kingdom second, but a long way behind. The 1919 production of the two countries was 169,328 tons and 60,087 tons respectively.

During 1918 barytes was being mined in forty-seven mines in the United Kingdom. No fewer than thirty-four mines were situated in England, seven in Wales, five in Ireland, and one in Scotland. Three quarries were also worked for barytes during that year in Derbyshire, Devon, and Somerset respectively, while in Derbyshire three open workings made returns.

Barytes Mines in the United Kingdom

The report gives a detailed account of the situation of barytes mines in the United Kingdom, together with particulars of the nature of the veins.

A deposit which is remarkable for its purity and whiteness occurs at a mine at New Brancepeth, which has a large output. The barytes is found with occasional patches of witherite in a fissure vein which varies in width from 4 ft. to 16 ft.

In Teesdale barytes occurs as a gangue in lead-bearing veins traversing carboniferous strata, while in Cumberland, and especially in the Lake District, barytes frequently occurs mixed with other minerals in metalliferous veins ; to the north, near Ireby, there is a vein of barytes of good quality.

In Westmorland the most important deposits of barytes occur in the east, in the Pennine Hills, where the veins are numerous and have been extensively worked. In the neighbourhood of Brough, the carboniferous limestone is seamed with barytes veins in every direction, many of these veins containing lead ore also. The Brough district is a part of the large mineral area which includes the Upper Teesdale, Durham, Lunehead, Yorks, and extends towards Alston in Northumberland, over the high moorland which is so rich in minerals. It is the richest barytes region in this country, but many parts of the district are remote from the railways, and the output of minerals is therefore seriously restricted.

Barytes veins occur in the north-western part of Yorkshire in the same mineral area as those in Westmorland, Durham, and farther north, where they are found in the carboniferous rocks of the Pennine Chain. At Lunehead these veins are numerous ; the workings are quite shallow and easily drained, and the spar is of good quality, but the nearest railway is nine miles distant. The only other part of Yorkshire where barytes occurs in sufficient amount to be of economic value is in the old lead-mining district of Upper Swaledale, where, however, the railway and transport facilities are also very poor, the nearest station, Richmond, being from fourteen to twenty miles away.

There are small occurrences of barytes in the Permain limestone on Forest Moor, near Knaresborough, the cavities in the rock being filled with this mineral together with occasional crystals of celestite. At the Lolly Mine, between Ramsgill and Lofthouse, witherite occurs in radiating masses associated with lead ore.

Bituminous Staining

Most of the barytes occurring in Derbyshire is discoloured and of low grade. In almost all the veins fluorspar forms the part of the vein nearest the limestone, being replaced by barytes towards the central part and in turn giving place to calcite. The Shropshire occurrences are found in two areas, separated by the Stiperstones ridge. To the west of the Stiperstones lies the old lead-mining district of Shelve, in which the veins carry barytes, galena and blende. To the east the ores of lead and zinc are unknown ; the barytes is frequently accompanied by small amounts of copper ore, and certain of the deposits have been worked for that ore. In the former area the barytes is typically white ; any colouration is due merely to superficial staining along joints and fractures, and can be removed by bleaching. In the latter area the mineral is almost exclusively of a pink colour, and is not amenable to ordinary bleaching processes. In both areas, particularly to the north, the mineral is often stained a dark colour by bituminous matter.

The strata of the Shelve area consist chiefly of an alternating series of grits and shales, with intercalated volcanic material, and have at the base the well-marked band of quartzite which forms the Stiperstones ridge. The main ore-bearing horizon is the Mytton Grits, immediately overlying the Stiperstones quartzite, but there are outlying occurrences of barytes higher up in the sequence as at Rorrington and Wotherton. In these veins the barytes forms a capping to the ores of lead and zinc. Some of the veins carry lead ore up to the surface, with little or no barytes.

In the Longmynd area the veins occur in ferruginous grits and the barytes is widely distributed in veins, varying from mere stringers up to deposits many feet in width. The district is remotely situated from rail transport, and the product had to be carted for considerable distances by road, but aerial ropeways are now being used. There are barytes veins around Llanidloes ; witherite also is present in these veins.

In Flintshire the barytes deposits occur near St. Asaph, in a vein from 9 ft. to 10 ft. thick. The barytes is associated with galena and zinc-blende, and witherite is found in pockets usually pure, but occasionally with adhering barytes. Many of the old dumps, which are of considerable size, contain much zinc-blende, barytes and witherite. Barytes veins occur near Carmarthen and near Bridgend, in Glamorganshire. All these veins carry small amounts of galena and other metallic ores. Subsidiary occurrences of barytes are noted near Bridgend and overlying Lias, where there are several small veins.

In Devon, vein-barytes is worked by open quarrying near Christow Station. The barytes occurs in masses up to 6 ft. in diameter.

Deposits of barytes occur in the counties of Renfrew, Kirkcudbright, Bute, Perth, Lanark, Caithness, and Ayr. In Kirkcudbrightshire the deposits occur in two veins, varying in thickness from 1½ to 6 ft.

In Ireland the only barytes mines at present being worked are in Sligo and Cork, though the mineral has also been found in the counties of Down, Galway, Limerick, Londonderry, Monaghan, Wexford, and Wicklow. The barytes veins in County Cork occur in the neighbourhood of Bantry, Ballydehob, Skull, and Roscarberry, where they are generally associated with copper minerals. Near Clonakilty, Duneen Bay, a very productive vein has been worked. In Sligo the barytes occurs associated with a little lead and copper.

Northumbrian Witherite Deposits

Practically all the witherite produced in the United Kingdom comes from the Settlingstones mine in Northumberland, where it occurs in large lenticular masses or " swells," in a nearly vertical vein averaging about 10 ft. in width and proved for a length of about 4,450 ft. This vein is remarkable as consisting almost entirely of witherite, calcite, barytes and galena occurring only in small quantities. The highest grade hand-picked lump witherite consists of slightly yellow or brownish-white crystalline masses, with a waxy lustre, containing from 93 to 100 per cent. of barium carbonate. Second-grade " lump " contains from 90 to 93 per cent., and third-grade " smalls " from 79 to 84 per cent.

Particulars are also given of deposits in other parts of the British Empire and in Belgium, France, Germany, Italy, Spain, and the United States of America.

Santonine and Gas Mantle Inquiries

Decisions against the Board of Trade

At the Board of Trade, on Saturday, December 10, judgment was given in the Santonine and Gas Mantles cases by the Referee (Mr. Cyril Atkinson, K.C.) appointed to hear complaints under Part I. of the Safeguarding of Industries Act. In the case of santonine, the Eastern and Russian Trading Co. and the Chemical Merchants and Users' Vigilance Committees contended that it should be removed from the list of dutiable chemicals; in the case of gas mantles, the British Association of Incandescent Gas Mantle Manufacturers and the nitrate of thorium manufacturers claimed that they should be included, while the National Gas Council opposed the claim.

Gas Mantles Decision

The Referee, in his first judgment, said that the complaint was that gas mantles had not been included by the Board of Trade in the list of articles covered by the words in the schedule, "compounds (not including ores or minerals) of thorium, cerium, and the other rare earth metals." In this judgment, the expression "gas mantle" would refer to the whole mantle, including the asbestos cord, mantle and collodion and, where it existed, the clay ring. The expression "mantle" referred only to the mantle proper. A gas mantle consisted, to all intents and purposes, of oxide of thorium and oxide of cerium. There was an infinitesimal quantity of ash, and sometimes there was a trace of beryllium oxide. There was also a very small quantity of alumina and magnesia at the head of the mantle, but substantially the mantle consisted of two compounds, both of which were chargeable with duty under the schedule. These two compounds did not form a chemical compound. They formed a mechanical aggregate or mixture, and they did not lose their identity. If these two compounds were separately imported they were chargeable with duty. The contention was that as they were mixed together they ceased to be subject to duty. It was said that the word "compound" meant chemical compounds, and that this mixture, not being a compound in that sense, was not within the section. In his opinion, the word "compound" was not used in the technical sense, and it covered mixtures as well as chemical compounds. Inasmuch as both ingredients were dutiable, a mechanical mixture of the two was equally subject to duty. The fact that a mechanical mixture was imported in the form of a mantle might well affect the amount of duty payable, but he could not see how, given that a substance was dutiable, it could cease to be so by reason of the form in which it was imported. He was therefore of the opinion that a mechanical compound of oxides of thorium and cerium in the form of a gas mantle, whether before or after the cotton or silk fabric was burned off, was subject to duty within the Act.

He was asked to go further, and say that the gas mantle, as it was a compound, was within the meaning of the words in the schedule. The gas mantle as a whole was clearly within section 1 (4). It was a compound article of which two substances, liable to duty and retaining their identity, formed part. He could not accept Mr. Terrell's contention, for the complainants, that the word "compound" in the schedule had the same meaning as "a compound article" within section 1 (4). While it was impossible to include gas mantles in the list of goods liable to duty, it was quite clear that the most material part of the gas mantle consisted entirely of substances which were liable to duty. He could foresee a question of some difficulty arising under section 10: "The value of any imported goods for the purpose of this Act shall be taken to be the price which an importer would give for the goods if the goods were delivered to him, freight and insurance paid, in bond at the port of importation, and duty shall be paid on that value as fixed by the Commissioners." Was the price which the importer would give to be the price he would give for the oxides of thorium and cerium in the form in which they were imported—*i.e.*, the price he would give for the mantle, or was it merely the price he would give for the oxides *qua* oxides? There might be much to be said in favour of valuing the dutiable substances according to the form in which they were imported, but that question was not for him to decide; it arose under section 10.

It was contended by Mr. Gray that even if the oxides or nitrates in question were chargeable with duty, there was no obligation to mention gas mantles or mantles in the list; and if mantles were chargeable in respect of any substances in their composition, these substances were covered by the words "oxide of thorium" and "oxide of cerium" or "nitrate of thorium" and "nitrate of cerium" already in the list, and that there was no necessity to go further and specifically mention mantles. He himself did not take this view. He thought that sub-section 5 (1) meant that if lists were issued they were to define the specific articles to be taken as falling within the general description in the schedule. If they examined the list it would be seen that the Board of Trade had taken the same view. Under the heading "Optical Glass," the Board had not been content merely to include lenses generically, but they had mentioned specifically twelve different lenses. Again, under "Optical instruments," one did not find generic expressions, but different instruments were specifically mentioned. Eight different levels were mentioned, and he thought that was right. The object of the list was to prevent disputes with the Customs officers, and to inform all persons interested exactly what articles were subject to duty. He thought words must be added to the list to make it clear that mechanical compounds of oxides or nitrates of thorium and cerium in the form of mantles were subject to duty. He therefore directed that there be added to the appropriate list the words "mechanical compounds of nitrates of thorium and cerium and of oxides of thorium and cerium in the form of mantles or forming part of mantles used in incandescent lighting." He wished to add this: he did not think he was entitled to take into consideration statements made in Parliament as to the meaning of words used in the Act or as to the intention of the Legislature.

The question of costs was raised, but the Referee declined to award costs on either side.

Santonine Decision

In the second case the Referee said the question was whether santonine, which had been included in the list as a fine chemical, should be removed. The first step was to ascertain the sense in which the word "chemical" was used in the schedule. Five chemists, men of considerable eminence, gave evidence and all defined the word differently. The definition given by Mr. Carr might include such substances as sugar, starch, and water, but he was quite satisfied that the word "chemical" in the schedule had been used in no such sense. Mr. Parry's view of a chemical was that it was a substance which had been manufactured by chemical processes or was itself a chemical agent for the purposes of chemical reaction. There were cases where the substance had been manufactured and was practically universally regarded as a chemical although not used for the purposes of chemical reaction, as, for example, asperin; but such cases were rare, and he did not think this definition could be taken as a definite test whether any particular substance was a chemical or not. Mr. Ronca had said that the characteristics of a chemical were that it was a prepared substance and a reactive substance, and that, generally speaking, it was a single identity so far as the substance was concerned. This definition did not carry one very far. It depended upon the amount of work put into the operations. On the whole, he gathered that to be a prepared substance within this definition the work of preparation must involve a certain amount of scientific knowledge and technical skill. The meaning of the espression "reactive purposes" was very vague, although Mr. Ronca did not limit it to chemically reactive purposes. There was no doubt what chemical reaction meant. It implied that they started with one commodity and added another commodity of a different constitution. What purposes were covered by the word "reaction," apart from "chemical reaction," he did not know, and Mr. Ronca found it very difficult to say where to draw the line. Mr. Ronca did not suggest that his definition was a scientific one, or one that was recognised. Indeed, when asked to say what his view of a chemical one was, he said: "I do not know about my view, but the view that was held by the Board of Trade was substantially, at least, that we realised the term was not a scientific one when speaking generally of chemicals, but we considered the term in its general sense, and we decided that the characteristics of a chemical were that it was a reactive substance and, generally speaking, a single identity." It seemed to him, therefore,

that Mr. Swan was justified in saying that the definition of chemical did not represent any generally accepted view.

For the purpose of this case there were two important points of difference between Mr. Parry and Mr. Ronca. Mr. Ronca would include the process of extraction involved in the preparation of santonine, but Mr. Parry excluded such a process and was strongly of opinion that only substances artificially brought into existence—*i.e.*, manufactured as distinct from substances which were merely extracted—could properly be called chemicals. The object of the Act was to protect industries, and Mr. Parry's view was more in harmony with the declared purpose of the Act than that of Mr. Ronca. Santonine was extracted from a flower which grew only in Southern Russia. A ton of the flowers yielded about 1 or 2 lb. of santonine, and the process of extraction was therefore almost necessarily carried on at or near the place where the flowers grew. The process seemed to him a more or less simple one, and in his opinion the Legislature never intended to tax a process of extraction, especially where that process could not be carried on practically in this country. He believed he was giving effect to the intention of the Legislature if he held that the word "chemical" in the schedule was used as applying to a substance manufactured by chemical processes. He therefore accepted Mr. Parry's view in this respect.

He also preferred Mr. Parry's view that a chemical was a substance primarily used for the purpose of chemical reaction. Mr. Ronca's view was that it was sufficient if the substance was used for reactive purposes, whether chemical or not, but he himself could not but think that in chemistry reaction was limited to reciprocal action of chemical reagents upon each other, resulting in chemical change. Mr. Ronca had said that santonine was particularly noxious to a parasite and drove it from the upper bowel to the lower intestines. He could not see what this had to do with chemical reaction, and his present opinion was that a chemical, for the purpose of this schedule, was a substance manufactured by skilled chemical processes or primarily used for the purpose of chemical reaction. Santonine was a substance neither of the one class nor of the other. Even if he thought that santonine was a chemical within the schedule, he should have great difficulty in accepting the view that it was a fine chemical, but he doubted very much whether chemicals could be classified as heavy and fine any more than stones could be classified as large and small. All the witnesses were agreed that a fine chemical was one requiring considerable skill in manufacture. That, indeed, was the main characteristic of a fine chemical. He was satisfied that a fine chemical must be substantially manufactured with the aid of skilled supervision during the carrying-out of the whole manufacture, and he should have great difficulty in finding that the process of extraction of santonine could fairly be described as a process requiring that high degree of skill necessary to bring a product into the class of fine chemicals. It seemed to him that Mr. Parry was right when he said that the skill required in the production of admittedly fine chemicals was incomparably greater than that required for the extraction of santonine.

The ground upon which he held that santonine had been improperly included in the list was that it was not a chemical in the sense in which that term was used in the schedule inasmuch as it was not brought into existence by a process of manufacture, nor was it used for the purposes of chemical reaction in any further chemical process or process of manufacture, or at all. He was not sorry that he had been driven to this view, because the taxation of santonine would benefit nobody, it would protect no industry, and it would safeguard no manufacturer, but it would merely raise the price of a very useful product.

The Question of Costs

THE REFEREE said he did not know if anyone wished to say anything about costs after what had been said in the previous case. Unless there were some special circumstances, he proposed to go on that ruling.

MR. SWAN, for the complainants, said that as it had been held that santonine had been improperly included in the list by the Board of Trade costs should be allowed in this case. His clients had been put to serious inconvenience and loss.

MR. TREVORS WATSON, for the Board of Trade, contended that any power which the Referee might have to award costs arose under section 23 of the Arbitration Act of 1889, and under that a Government Department could not be awarded costs nor could it have costs awarded against it.

THE REFEREE said that, supposing the decision had been the other way, Mr. Swan could have said, with a great deal of force, that, having raised a case in the interests of industry, it was very hard to be ordered to pay the costs of the other side. He did not propose to order costs in this case.

Board of Trade's Right to Appeal

MR. TREVORS WATSON said he did not know whether the Referee's decision was to be regarded as his award, or his opinion upon which he proposed to found his award. The question of defining a chemical or a fine chemical was obviously one which was going to be very decisive in dealing with other cases, and as it was one of very great importance the Board of Trade had instructed him to say that, in their view, it would be best if the Referee could state his award in the form of a special case, defining the terms "chemical" and "fine chemical."

MR. SWAN called attention to the latter part of sub-section 5 of section 1 of the Safeguarding of Industries Act, which stated that the Referee's award should be final and conclusive. That clearly indicated that no further opinion should be taken.

THE REFEREE said that if he held that he had no power to state a case, the proceedings to get that decision tested would be very complicated. The decision, however, could be tested. He would want a lot of persuasion to state his award in the form of a special case because that meant that the Board of Trade could take the matter right through to the House of Lords, and he did not think it was the intention of the Act that parties should be put to such expense. An arbitrator could state a case so that it went to one tribunal—he believed the Divisional Court—from which there would be no appeal; and he would not be inclined to do more than that, because he did not think it was intended that persons raising questions under this Act should be put to the expense of going to the House of Lords. Moreover, had he known the Board of Trade were going to make this application he would have taken another view with regard to the matter of costs. If these cases were going to be treated as litigation costs ought to be dealt with in one way, whereas if they were going to be treated as an arbitartion, costs would be dealt with in another way. Moreover, if a party was going to ask that the award should be stated in the form of a special case, the application should have been made before the award was given. He had not, however, yet signed his award, and he did not suppose it was technically too late. If he were directed by the Board of Trade he would do his best to raise any point of law asked for in the award to be dealt with as a special case by the Courts, and if that were done before the award was signed, then the decision as to costs would not hold.

MR. TREVORS WATSON said he agreed with that, and would change his application and ask that a case should be stated for the opinion of the Court.

THE REFEREE said in that case the Board of Trade must submit the points of law upon which they wished him to state a case, because he did not know what they were. It seemed to him that it was all fact, but the Board might take quite a different view. The Board must frame its request carefully *in writing and he would do his best to raise it in the form of a* case. Mr. Terrell, in the gas mantle case, had asked him not to sign the award as he would like to consider whether there was any question of law upon which parties might ask for a case to be stated. Therefore, he would sign neither awards until the parties had intimated to him whether they wanted him to state a case. But, as he had already said, he would want a lot of persuasion before he did more than state a case on a point of law for the Divisional Court.

MR. SWAN.—I should ask you to reconsider your ruling as to costs in that event.

THE REFEREE.—I will consider that. He also suggested that there should be a time-limit within which the Board o Trade and the other parties should send in their request as to his stating a case, and in the meantime he imagined his decision would be acted upon.

MR. ASHLEY (Board of Trade) said that the list only became operative when it was published in the *Gazette*, but they would proceed as expeditiously as possible.

THE REFEREE said it might be six months before the case was finally disposed of, and was santonine going to be taxed all that time?

MR. TREVORS WATSON said that no steps could be taken until the Referee had signed his award.

THE REFEREE.—I can sign that to-day, but if there is going to be delay it seems to me that no matter how expeditious you are it may be months before this is decided.

MR. TREVORS WATSON said that until such time as the Referee had signed his award nothing could be done. If the Referee would give a certain time-limit in which to consider whether the Board of Trade desired to entrace a point of law for the decision of the Court, that should help matters.

THE REFEREE said he could not sign his award until he had received the point or points that he had to put before the Court, and it would be no award in that event until the matter was decided.

MR. SWAN raised the question whether, the Referee having delivered his award, Mr. Trevors Watson had the right to ask for it to be stated in the form of a special case. The usual rule was that such an application should be made before the award was delivered, and it seemed to him that it was now too late to make the application.

THE REFEREE said he himself rather thought the application was too late.

MR. TREVORS WATSON.—If you take that view I will not press it.

THE REFEREE said that he would prefer the Board of Trade to drop the application with regard to the santonine case.

MR. TREVORS WATSON said he would not press it in that case. He took it that the Referee would not necessarily take the definition he had given in his judgment as to a chemical as binding upon himself in other cases.

THE REFEREE said he would not, because he regarded it as a matter of fact in this case, and one to be determined on the evidence in each case. If an application was to be made to him to state a case, then it must be done within seven days. In the gas mantles case the words which he proposed to add to the list were: "Mechanical compounds of nitrate of thorium and cerium and oxides of thorium and cerium in the form of mantles or forming part of mantles used in incandescent gas lighting."

MR. TERRELL.—Then I do not think we shall ask you to state a case.

MR. SWAN.—I ask that santonine be removed from the list forthwith.

This closed the inquiry.

The Case of Calcium Carbide

Third Inquiry Opened

AT the Board of Trade on Saturday, December 10, Mr. Cyril Atkinson, K.C., the Referee, under Part I. of the Safeguarding of Industries Act, opened an inquiry into a complaint made by the British Cellulose and Chemical Manufacturing Co., Ltd., and British Carbide Factories, Ltd., that calcium carbide has been improperly excluded from the list issued by the Board of Trade. The complainants were represented by Sir Arthur Colefax, K.C., Mr. J. Hunter Gray, K.C., and Mr. Moritz. The opponents are: Messrs. Allen, Liversedge & Co., Ltd., the British Acetylene and Welding Association, and others, represented by Sir Duncan Kerly, K.C., and Mr. Courtney Terrell; and the Acetylene Corporation of Great Britain, Norwegian importers, and a Swedish Manufacturing company, represented by Mr. Douglas Hogg, K.C., and Mr. Stafford Cripps. The Board of Trade was represented by Mr. Trevors Watson.

SIR ARTHUR COLEFAX, opening the case for the complainants, said that calcium carbide was a key industry, and there could not be much conflict on the one or two facts that he would state. It was a key industry in the sense that the product obtained from it—and it was always used and only used to give acetylene—was the starting-point, in one sense, of a whole range of organic bodies, and a certain number of very important synthetic manufactures, such as acetic acid, acetone and others. During the war the British Cellulose and Chemical Manufacturing Co. were requested to establish, and did erect, in this country an extensive plant for the manufacture of calcium carbide. The British Carbide Factories, Ltd., were also asked to stimulate their production. The largest use for acetylene in this country was for oxy-acetylene welding, and its use for lighting was less important. During September this year, 66,825 cwt., of a value of £58,386, were imported into this country, and during October, 37,668 cwt. of a value of £33,683 were imported, and more than half the total imports came from Norway. When the war broke out, the price was about £12 per ton, and to-day it was about £14. As to the home production, the British Cellulose Co. had a plant which cost £600,000 for the manufacture of carbide only, and the capacity was something like 100 tons per day. British Carbide Factories, Ltd., had a plant which cost £40,000, and a capacity of 5,000 tons a year, but not one ton of carbide was being produced in this country at the present time, and the conditions were such that there seemed every prospect of the industry being killed altogether.

The ground of complaint now being made was that calcium carbide was a synthetic organic chemical, as mentioned in the last section of the schedule, and as such, out to be included in the list.

Mr. Ballantyne's Evidence

MR. H. BALLANTYNE, consulting chemist and vice-president of the Institute of Chemistry, expressed the view that calcium carbide was a synthetic organic chemical. He was not prepared to give a definition of the word "chemical," but generally it was taken to include substances of commercial utility, which utility depended on their chemical composition. He had listened to the judgment given in the santonine case, and was very much inclined to agree with the definition given there by the Referee. A synthetic chemical could be described as one which consisted essentially of a single compound which had been produced either directly or indirectly by the chemical combination of its elements, and an organic chemical was one which consisted essentially of a single organic compound. Academically, organic chemistry was the chemistry of carbon and its compounds, but for practical purposes the definition was narrowed somewhat. Carbon was the significant part of the molecule in calcium carbide, and that was the determining factor with chemists when classifying chemical bodies. The fact that calcium carbide contained calcium as one of its elements did not, in his view, bar it from being regarded as an organic chemical. There were many such substances which were, nevertheless, regarded as organic compounds—for instance, calcium formate, which contained 30 per cent. of calcium and only 18 per cent. of carbon. That was properly regarded as an organic compound. Then there was barium formate, which contained 60 per cent. barium and 10 per cent. carbon. The calcium in calcium carbide was only of importance in fixing the acetylene part, and he had never heard of anyone wanting calcium carbide as such. It was only used as a basis for obtaining other compounds.

SIR DUNCAN KERLY subjected Mr. Ballantyne to a long cross-examination. The witness defined a fine chemical as being a refined chemical of a purity such as one associated with pharmaceutical chemicals, prepared under highly skilled supervision and skilled labour, and into the cost of which such supervision and labour entered as a substantial element. In the process of manufacture there must be a chemist watching every batch, but he did not suggest that calcium carbide was a fine chemical. At the same time, considerable skill entered into its manufacture.

COUNSEL suggested that the degree of skill was not very great. He described the process of manufacture as that of mixing coke and lime, putting the mixture in iron trucks, running them into an appropriate position, and placing it in the electric furnace, after which the current was turned on and the temperature raised so high that the mixture was fused. Then the current was turned off and the stuff was run off.

MR. BALLANTYNE said there was need for an electrician, and chemists had to be employed regularly for the routine testing.

There was a long discussion as to what are organic and what are inorganic chemicals, but the witness adhered to the opinion he had already expressed. He agreed that from an academic point of view some things were regarded as inorganic but in practical working they were classed as organic. The result of it all was that counsel admitted that he was quite out of his depth. The witness and counsel agreed that acetylene was an organic compound, but disagreed as to calcium carbide being organic.

MR. HOGG, K.C., also cross-examined, the point being that in a large number of text-books which he produced calcium carbide was treated under the head of "inorganic" and not under "organic."

MR. BALLANTYNE said this was explained by the fact that calcium could not be discussed apart from calcium carbide, nor apart from acetylene, and they were so near the line of division that very often calcium carbide was mentioned in both the organic and inorganic sections of text-books.

The inquiry was adjourned until to-day (Saturday).

Safeguarding the British Glass Industry

First Inquiry Opened under Part II.

THE Committee appointed by the Board of Trade under Part II. of the Safeguarding of Industries Act to investigate complaints as to dumping of glassware into this country held its first public sitting at the Windsor Hotel, London, on Monday. All the members of the Committee were present, namely, Sir William Ashley (chairman), Sir T. W. Allen, Sir John Barran, Mr. F. R. Davenport, and Mr. J. A. Aiton.

THE CHAIRMAN said that the Committee had been appointed under Part II. of the Safeguarding of Industries Act, 1921, to hear a complaint by the Flint Glass Manufacturers' Association and the National Flint Glass Workers' Society that articles of domestic glassware, illuminating glassware, and mounting glassware manufactured in Germany and Czecho-Slovakia are being sold or offered for sale in the United Kingdom at prices at which, by reason of the depreciation in value of the currency in foreign countries are below the prices at which similar goods can be profitably manufactured in the United Kingdom, and that by reason thereof, employment in the glass industry in the United Kingdom is being, or is likely to be, seriously affected.

SIR ARTHUR COLEFAX, K.C., and MR. ERNEST EVANS appeared for the China and Glassware Section of the London Chamber of Commerce.

Flint Glass Manufacturers' Case

MR. J. D. HARWARD, Secretary of the British Flint Glass Manufacturers' Association, stated that there were about forty firms engaged partially or wholly in the trade. The Association employed, or was interested in, 79 per cent. of the total number of employees in the industry. Large developments took place after the war broke out, and the branches of the trade relating to electric lamps, lamp chimneys, and illuminating glassware had only taken root since 1914. The industry embarked on these new developments because imports of these goods were entirely suspended, and there was a very great shortage. The manufacture of electric lamp bulbs was taken up under considerable pressure from the Ministry of Munitions. At the close of the war the Association received a letter of thanks from the Director of the Glassware Department of the Ministry of Munitions, Sir Arthur Colefax. Describing developments in the industry he said that one feature of recent years was the establishment of chemists' departments on the works. Chemists were now constantly examining and testing materials and investigating the mixtures and in this way scientific methods were replacing rule-of-thumb methods. In most up-to-date factories that work was now controlled by chemists.

On the question of prices, it was pointed out that to-day's prices for the classes of glassware now being considered, viz., domestic and illuminating, were about 130 per cent. higher than the pre-war figures, and the difference had reached 150 per cent. It was intimated that the consideration of details of British prices and the percentage of profit would be dealt with in private.

Foreign Competition

MR. HARWARD went on to explain that samples and quotations for wine glasses and tumblers had been obtained from Czecho-Slovakia, and the figures placed before the Committee represented the foreign price, and the price at which the British manufacturers could supply, in quantities, a similar article. Special evidence would be given with regard to electric incandescent lamp bulbs from a firm which had specialised in that manufacture more than the members of the Association. Samples and prices of illuminating ware, however, had been obtained from Germany in the same way as before, and here it was seen that the present British labour cost was as much as the selling price of the foreign article.

In reply to Sir Thomas Allen, Mr. Harward said that it was curious that buyers preferred to buy foreign lime metal goods, and there was no reason to believe that even if the British manufacturer turned them out the buyers would prefer them to the foreign article. He did not think any cheapness abroad was due to mass production. As an instance of British and foreign prices he mentioned tumblers which were quoted at 2s. 6½d. as against 6s. in this country. A tax of one-third would not wipe out that competition, but together with the general improvement in the rate of exchange and the tendency to buy British goods when prices were close to each other, he thought it would go a long way. With a tax of one-third he believed we should have an excellent chance of competing.

New English Glass Company

MR. JOHN NORTHWOOD, managing director of the New English Glass Manufacturing Co., Ltd., said that his company was formed in 1913 and started to erect new works solely for the manufacture of illuminating glassware. The best German and Austrian designs of plant were taken and Austrian builders came over here to erect it. Gas furnaces of the regenerative type were put down with their attendant annealing ovens and lehrs, and the system of manipulation was the most up-to-date that could be found. They engaged specially skilled hands from Germany and Austria to come over here and teach his British employees in their most up-to-date methods. The works were put into operation in 1914 and until 1915 they were engaged on simple repetition work and turned out large quantities of gas mantle globes. The Board of Trade visited the works and complimented them upon their methods and asked them to make other lines which hitherto had only been made abroad. The country was then beginning to suffer from the shortage, but the Englishmen, who had been instructed by the Germans and Austrians, were able to turn out all kinds of illuminating ware, miners' lamp glasses, electric bulbs, arc lamp globes, and special heat-resisting qualities not turned out before, as well as glass for wireless telegraphy, lamps for submarine work, and various other lines. He himself had seen most of the works in Germany and Czecho-Slovakia, and he could safely say that British labour now compared favourably with the very best Continental, and it only needed sympathetic consideration for the trade to re-establish itself. In 1917 the Ministry of Munitions pressed them to enlarge their works and that was done, and the capacity was increased to employ from 500 to 600 men. More modern furnaces were installed with annealing lehrs, as well as workshop plant, but unfortunately they had never had an opportunity of working that enlarged plant because it was finished only at the beginning of this year, and by that time the flood of imported glass had begun which had had such a calamitous effect on the British trade. Before the extensions were carried out at the works he was employing 120 men. To-day he was only able to employ fifty to sixty men for three days a week, and that was due entirely to the foreign imports and competition due to the depreciated currency. He sincerely believed that if a tax of one-third was placed upon imported glassware, the British firms would be able to obtain orders. Foreign competition was felt before the war, but to nothing like the present extent. The present difficulty was purely one of exchange; apart from that British firms were prepared to hold their own. The prices of British glassware placed before the Committee as to-day's prices were based on the abnormal rate of exchange prevailing and the abnormal conditions generally.

Evidence of Chance Brothers

At the adjourned sitting on Tuesday evidence was given on behalf of Chance Brothers & Co., of Smethwick, represented by Major W. L. Foster (a managing director), Mr. W. L. Chance (a director), and Mr. A. E. Bassett (sales manager). The firm complained that heat-resisting glass used for illuminating purposes was being imported into this country from the Continent at prices below the price at which similar goods could be produced here. A statement was handed to the Committee, certain portions of which were confidential, and questions relating to those paragraphs were put to the witnesses in camera after the public sitting.

MAJOR FOSTER first read a letter which his firm had written to Sir Robert Horne, then President of the Board of Trade, in September, 1920, which contained information as to the industry. In this it was pointed out that the heat-resisting glass industry was first taken up in this country owing to the exigencies of the war, but owing to the unrestricted importation of the commodity into this country it was in serious danger of being lost. Heat-resisting glass formed an essential part of many lighting systems at present in vogue. It was not produced in this country prior to the war, when practically the whole of the quantity used was being imported

from Germany and Austria. In 1914 supplies were completely cut off, and lamp manufacturers brought the matter to the notice of the Government, with a view to getting them to induce some English firm to take up its manufacture. The firm started in an experimental way in 1915, and had continually developed, with the result that the glass supplied by Chance Brothers was generally admitted to be equal to that of the best Continental makes. The firm had spent a large sum of money, on which they had seen no return up to the end of the last accounting period; in fact, the department concerned with the production of this particular type of glass had shown a loss each year. The Company were able to meet the demands of the most important gas companies and lamp manufacturers in the country. It was pointed out that heat-resisting glass had very good claims for protection, quite apart from the ordinary lighting glass, because it was an entirely new industry in this country, and also, owing to the constitution of the glass it was more closely allied to chemical and scientific glassware. Since restrictions had been removed the market here had become considerably overstocked; the prices quoted by foreign manufacturers were lower than Chance Brothers could meet, owing to the rates of exchange. If these conditions continued, and the Government failed to give adequate protection, it was quite certain that this important industry would be again lost to the country. If Chance Brothers had not anticipated that in all probability the heat-resisting glass industry would have been scheduled as a key industry, they would have abandoned manufacture after the armistice.

MR. W. L. CHANCE pointed out that the cost of manufacture could be enormously reduced if the output could be increased. It was only because the ouput was so small that the cost of manufacture was so much higher than that of the imported goods.

MAJOR FOSTER, in reply to the Chairman, said that the costs of manufacture reached their highest point at the time of the coal strike, since when there had been reductions in wages, fuel, and raw materials. The prices of the articles produced, however, began to be reduced before these reductions in costs had come about, and the reductions in price exceeded the reductions in manufacturing costs. With regard to labour, the heat-resisting glass department employed about 150 hands at their most successful period, which was about one-tenth of the total number employed in the whole works. In the second quarter of this year the department had been closed down, but now there were about sixty people employed, or the equivalent of sixty people working full time; they shared the work as much as possible. At the present moment the company were selling their output, but they had a very large stock.

Asked by the Chairman how it was that the company were able to sell their heat-resisting glassware at all, Major Foster replied that it must be on account of the quality.

Loyalty of British Firms

MR. BASSETT here referred to the loyalty which the English lamp manufacturers and gas companies had shown to the new industry. Chance Brothers were of great assistance to them during the war, and they had stuck loyally to the firm since. In many cases they had shown the firm lists of foreign prices, and had asked them how near they could get to those prices. In one case they had fixed up a contract for a year's supply; the price quoted was 50 per cent. above the foreign price, but it was accepted.

MR. CHANCE said that figures had been received from time to time which proved that the breakages with the firm's glass only amounted to about one-third of those which occurred when foreign glass was used, so that, although the price was higher, that was considerably offset by the better quality.

MR. BASSETT gave actual figures in this connection. The South Metropolitan Gas Co., who obtained all their heat-resisting glass from the firm, kept very accurate statistics as to public lighting, and in a letter written to Chance Brothers they had stated that the average replacement per lamp for the six months ending June, 1913, using German glass, was 2.27, whereas the average replacement for the six months ending June, 1920, using Chance's glass, was 0.64.

The Government's Attitude

In reply to the Chairman, who asked for fuller information with regard to the encouragement which had been received prior to the starting of the industry in this country, Major Foster said that the firm had always been very much concerned as to what would happen after the war. They were constantly having interviews with officials of the Glassware Section of the Ministry of Munitions, and all the encouragement was verbal.

MR. CHANCE added that it was not so much the actual words used, but the atmosphere that was created, that they need not bother their heads about what would happen subsequently; they would be looked after if they took up the manufacture of this glass. The firm had been pressed to start well over a year before they actually did so, but he admitted that there was absolutely nothing in writing.

MAJOR FOSTER said that owing to the restriction of imports during the war the industry had a certain amount of protection, and if they were protected enough to enable them to manufacture on a sufficiently large basis, they were prepared to try to hold their own against the entire foreign trade.

Further evidence was taken in committee.

Trade Union Support

COUNCILLOR WILLIAM BRADFORD, financial secretary to the National Flint Glass Makers' Association, said the membership of the Association was now 1,200, but since April of this year no fewer than 564 had been out of employment, and the Association had, since April, paid 75 per cent. of its capital away in unemployed funds. Furnaces were being shut down all over the country, and those members who were not actually unemployed were working very short time. Newcastle-on-Tyne was one of the Association's largest districts, so far as members were concerned, but unfortunately during the last five weeks the works there had been closed down altogether. During the war 50 per cent. of the members joined the forces and boys were trained to take their places in order to maintain the output as there was such a great shortage owing to foreign imports being cut off. The members of the Association who remained at home did their best to increase output and to train the boys, and in 1918 he was sent for by the Ministry of Munitions and thanked for what the union had done. The trade was prosperous until the beginning of this year. In April, when the coal strike took place, the depression began to be felt and from that date onwards the unemployment had continued to increase. He put the position down to the state of the exchange and the competition of cheap glassware from Germany and Czecho-Slovakia. It might be thought that the British glass maker was receiving too high a wage for his work, but from the figures he did not think so.

Thomas Webb and Corbett

MR. HERBERT WEBB, of Messrs. Thomas Webb & Corbett, gave further evidence on behalf of the Flint Glass Manufacturers Association. Dealing with output, he said there were seventeen furnaces idle and of these seven were quite up-to-date machines built within the last three years. It had been asked why it was that furnaces which had been built since the war had not been put into operation. The explanation was that up to the end of 1920 building was a very difficult and laborious matter and furnaces which, in the ordinary course, would be built in five or six months, had taken a year or two years to complete. Certain furnaces, for which the orders were given in 1918, were not completed until the end of last year. When they were completed, the slump had come and they had never been put into operation. The capacity of the members of the Manufacturers' Association was infinitely greater than it was before the war. If something could be done to deal with the position of the exchange he was convinced that in the course of a few years we should be able to hold our own with foreign competition.

MR. NORTHWOOD, in some final remarks on behalf of the manufacturers, said that if British manufacturers increased their output they could hold their own, but just when they had spent a large sum of money with that aim in view, the slump came, and the competition now was too great for them.

The next public sitting of the Committee will be held on Tuesday, December 20.

Chemistry Bursary and Scholarship Awards.

THE SENATE OF GLASGOW UNIVERSITY has allotted the Donaldson Bursary in Chemistry (£44 for two years) to Mr. J. M. Robertson; the Mackay Smith Scholarship in Chemistry (£48 for two years) to Mr. S. T. Mitchell; and the Malcolm Kerr Bursary in Chemistry (£25 for three years) to Mr. F. R. Sterrie.

Oil and Colour Chemists

Comparative Colour Measurements

At the December meeting of the Oil and Colour Chemists' Association a paper was read by Professor F. M. Lowry on "Comparative Colour Measurements by Various Systems" as a part of the adjourned discussion on "The Theory and Practice of Colour Measurement," in connexion with the paper read by Mr. Bawtree at the November meeting. Dr. R. S. Morrell, President of the Association, was in the chair.

Dr. Lowry said the measurement of colour was quite a different story from the measurement of quantities of absorption of light throughout the spectrum. It rested on the fact that one could deceive the eye by producing a mixture of three constant colours, and persuade the eye to recognise that mixture as identical with the natural or artificial colour, the ingredients of which might be somewhat widely different from those of the mixture used to match it. In order to produce these matches, different methods might be used. They might, for instance, add together the coloured lights, namely, the red, green and blue, or they might subtract from white light the various constituents, in which case they generally used a minus red, a minus green, and a minus blue, the contents of which were obtained by subtracting these colours from white light. There were now instruments in which both these methods were adopted, and the object of his paper was to compare these instruments from the point of view of the analysis of the spectral colours as they were produced. In the Bawtree instrument the method of addition had been adopted, and he hoped it would be understood that his criticisms of this and of the Lovibond instrument, which adopted the method of subtraction, were made purely from the point of view of pointing out how these instruments could be improved, because they all appreciated very fully the valuable work which Mr. Lovibond and Mr. Bawtree had done.

During the last six months or so he had been able, with the help of a colleague and a spectraphotometer, to make a complete study of the filters which Mr. Bawtree had used for producing his red, green and blue, and also the filters in the Lovibond tintometer, used for producing the minus red, the minus green, and the minus blue. One feature of the Bawtree instrument was that in order to minimise the difficulty of getting the white light, the width of the aperture in the case of the red, green, and blue light was varied; the slits which transmitted the red light were not the same as those which transmitted the green and the blue. The curves of all three colours, however, were very wide apart, and the ideal would be to have a red, green, and blue, which would all add together and give a more or less level curve. The limit of red vision varied a good deal between different persons, and it was in the extreme ends of the spectrum that these variations were most pronounced. In the Bawtree instrument as constructed, if the substance transmitting the light was in the very deep red, an observer who was sensitive to red light would make a different match from that of an observer who was sensitive to light of a shorter wave length. That same effect was not noticeable at the blue end of the spectrum, because in the instrument there was a complete absorption. It was this very strong transmission in the red which was a weakness in the instrument, although he could not say that it was of immediate practical importance. Another feature was that none of the screens used with the instrument transmitted yellow light, and the result was that the instrument, as made, for the reasons which he had mentioned, gave different readings with different sources of light, and possibly with different observers.

In the Bawtree instrument the amount of each colour let through was varied by varying the width of the slit, and in that case there was an exact linear relationship between the scale on the one hand, and the intensity on the other. If they opened the slit twice as wide, they let through twice as much red light, and the scale and the intensity were directly proportional to one another. In the tintometer it had been necessary to build up that linear relationship on a different basis, namely, there was a scale of numbers, the slides were all numbered, and two conditions had to be fulfilled. First, in the case of minus red, green, or blue, if they took the number 10, then all these tens added up to a pure grey, but there was another condition, that if they took nine minus red and one minus red, these two must add up to the same as ten, and they had to build up an additive scale on the colour filters. It was interesting to know the scientific basis for that. When light went through a medium it might absorb, say, 50 per cent. of the light of a particular wave length. If it went through two thicknesses of the medium, it absorbed half of what was left, so that adding the two filters together did not double the absorption; it altered it in a fixed ratio. The scale numbers were a geometrical progression and not an arithmetical one.

There was one point which was of very great interest in connexion with the tintometer, viz., what were the densities actually corresponding to the numbers? That could be deduced, although with some difficulty. He had taken No. 10 of the minus green, and No. 10 of the minus red and blue and produced what was nearly a white light, and he found that these three 10's gave a total density of 1.5, *i.e.*, the logarithm of the ratio of the incident to the transmitted light. That was data which had never been given before, and it was probably the first record of an attempt to measure what was the density corresponding to the numbers in the tintometer, and it put the thing on a quantitative basis. In that way one could work out what was the actual percentage of light reflected, and measure quantitatively the absorbing power of the material that one wished to compare with the white light.

Dr. Edridge Green thought Dr. Lowry had said the last word on the physico-chemical aspect of this subject. The curves which Dr. Lowry had shown were very similar to those he himself exhibited at the Royal Society of Arts in 1889. The question of colour mixing, however, had to be carefully distinguished from the commercial or practical aspect. The purely scientific aspect of colour had been very generally neglected hitherto.

Miss Baker, who is associated with the Lovibond tintometer, said that the curves which Dr. Lowry had shown had been dreamed of in the laboratory for years. The effect of the greater proportion of red which Dr. Lowry had mentioned had been the subject of investigation—indeed it was the last work that Mr. Lovibond had done, and it had been recognised as a matter of great importance. Another practical point was that it was interesting to find that quite independent work by Dr. Lowry should have confirmed what had been found to be the case in practice with regard to colourless glasses.

Mr. Bawtree said that since the last meeting he had examined some one hundred specimens, with a view to giving an exhaustive indication of the use of the colorimeter, but the preparation of the samples took so long that he had only been able to get out a record of eighteen of them. He hoped to work out the records of the remainder of the one hundred samples to which he had referred and publish them later.

Constitution of the Glycerophates

Presidential Address by Professor F. L. Pyman

For his presidential address to the Manchester College of Technology Evening Students' Chemical Society, Professor F. L. Pyman took as his subject: "The Constitution of the Glycerophates." Phosphatides, he pointed out, were naturally occurring fatty bodies which contained nitrogen and phosphorus. The best known was Lecithin, which occurred in the yolk of eggs to the extent of about 10 per cent. It was a mixed ester of glycerol with palmitic, oleic, and phosphoric acid, the latter being further esterified with choline. On alkaline hydrolysis it yielded glycerophosphoric acid, the salts of which were used in medicine, though their advantage over the simpler calcium phosphate was doubtful. It might be noticed that Wilstätter had shown that salts of glycerophosphoric acid were optically active, whence some at least of the α compound must be present.

A number of different esters of glycerol and phosphoric acid had been prepared, but only in 1903 was a product obtained (by Carré) approximating to the naturally-occurring mono-glycerophosphoric acid, by heating glycerol with orthophosphoric acid at a temperature of not exceeding 105°C. The calcium salt which was generally manufactured was more soluble in cold than in hot water (1 part in 22). The sodium salt formed a syrup. At a higher temperature the product contained some of the di-ester.

In 1907 Poulenc Frères put on the market a crystalline sodium glycerophosphate prepared by heating glycerol with mono-sodium phosphate and splitting off a molecule of glycerine from the diglycerolphosphate by means of caustic soda. It appeared probable that one of these preparations was the α acid and the other the β. King and Pyman

attacked the problem synthetically and prepared a compound which was undoubtedly the β acid, and which was found to be identical with that manufactured by Poulenc Frères.

Starting with αα′ dichlorhydrin a phosphoryl chloride was obtained by treatment with phosphorus oxychloride. This, on hydrolysis with milk of lime, yielded calcium bis-αα′ dichloro-iso-propyl phosphate, which was boiled with the calculated amount of sodium carbonate and yielded one molecule of glycerol and the sodium salt of glycerol β phosphoric acid. The analagous method to prepare the α acid failed because it was found that the phosphorus was removed at the same time as the halogen. By treating α monochlorhydrin with sodium phenate α phenoxy-glycerol is obtained, and a similar method was used to prepare the α acid, α monochlorhydrin was treated with trisodium phosphate and finally glycerol α phosphoric acid was obtained. The sodium salt was crystalline, but so deliquescent that it very soon became syrupy. The calcium salt is soluble to the extent of 1 part in 50 water.

Denigès had shown that dihydroxyacetone could give colour reactions with phenols and sulphuric acid, and Grimbert and Bailly attacked the problem from that point of view. Assuming that oxidation could be accomplished without hydrolysis, only the α compounds could yield a ketose ($R.CO.CH_2.OH$) analagous to dihydroxyacetone and give a positive result when submitted to Denigès test. They found that ordinary glycerophosphates gave a positive result and those of Poulenc a negative. This confirmed the work of King and Pyman. A further synthesis of the α-acid was carried out by Bailly by the alkaline oxidation with permanganate of allyl phosphoric acid.

Recently Abderhalden has isolated optically active glycerophosphates. After resolving βγ dibromopropylamine he isolated the optically active bases from which by treatment with nitrous acid he obtained the alcohols. From these, by splitting off hydrobromic acid, the active epi-brom hydrins were obtained. Hydrolysis to the active brom hydrins and esterification with phosphorus oxychloride followed by elimination of bromine gave optically active α glycero-phosphates, which were isolated as the lithium salts.

Institution of Chemical Engineers

Election of Officers

THE first meeting of the provisional committee was held on Wednesday, December 7. Sir Arthur Duckham and Mr. J. MacGregor were unfortunately absent.

Professor J. W. Hinchley reported that the proposed organisation was receiving remarkable support, and a discussion took place as to whether any of the institutions already in existence might do the work in any way that it was proposed should be done by an institution of chemical engineers. After consideration of the different institutions in existence, it was unanimously agreed that no other institution was in a position to attempt the work, and that any co-operation to be made must be left for the future.

The officers of the proposed Institution of Chemical Engineers were then elected as follows :

Chairman.—Sir Arthur McDougall Duckham, K.C.B.
Vice-Chairman.—Mr. W. J. U. Woolcock, M.P.
Honorary Treasurer.—Mr. F. H. Rogers, M.I.M.E.
Honorary Secretary.—Professor J. W. Hinchley, Wh.Sc., F.I.C., A.R.C.S.
Assistant Hon. Secretary.—Mr. Newitt.
Assistant Secretary.—Mr. A. C. Flint.

A discussion took place with reference to increasing the number of the committee, and it was agreed that the number be limited for the time, but that additional members be co-opted as the work of the provisional committee demanded.

Professor Hinchley reported that a number of donations had been received and promised, amounting in all to about £500. He had no doubt that other voluntary donations would be made by supporters of the movement.

It was agreed that the next meeting of the provisional committee should be held on Wednesday, December 21, and that a draft of the constitution of the Institution of Chemical Engineers should be submitted for discussion, alterations or approval.

It was agreed that an enquiry should be made as to the reason of the collapse of the different attempts that have been made to form an Institution of Chemical Engineers in 1880 and 1890, and Dr. Smith and Mr. D. Brownlie agreed to report on this matter at the next meeting of the committee, in order that advantage might be taken of the experience gained on those occasions.

In view of the importance of founding a permanent and yet adaptable Institution of Chemical Engineers, it was agreed that as much publicity as possible should be given to the work of the provisional committee, and that copies of the minutes of proceedings should be sent to all those who have indicated their interest in the project. It is hoped that this method will produce the maximum number of suggestions and constructive criticism which will help the work of the committee.

Chemical Works Organisation

Use of Compressed Air in Works

IN his final lecture on "Chemical Works Organisation and Lay Out," delivered on December 7 under the auspices of the Newcastle-on-Tyne Section of the Society of Chemical Industry and Armstrong College, Dr. W. B. Davidson dealt largely with works services, with special reference to metals suitable for conveying and containing different acids, such as sulphuric, nitric, and hydrochloric; he also dealt with the special qualities of silica and silican iron and other materials. It was pointed out that in dealing with waste acids obtained in the manufacture of explosives the conditions were very severe owing to the presence of quantities of sludge of an explosive nature. Dr. Davidson emphasised the convenience of compressed air for works purposes, and also the advantages derived from the use of high and low pressure steam. The employment of super-heat was also desirable, providing that special attention was paid to the insulating of the pipe lines. A number of modern instruments used in works services were exhibited, and particular interest was taken in the "Katharometer," an invention of Dr. Shakespeare, of Birmingham University. The instrument, said Dr. Davidson, was largely used for the detection and testing of hydrogen in connexion with aviation, and was now being utilised for the measurement of CO_2 in furnace work. Other exhibits were recording pressure gauges, sensitive vacuum indicators, high pressure recorders, and a variety of the best types of indicating and recording pyrometers.

A Scientific Kinematograph Evening

The Importance of the Industrial Film

JOINTLY arranged by the Chemical Industry Club and the London Section of the Society of Chemical Industry, a scientific kinematograph evening was held on Tuesday in the hall of the Institute of Mechanical Engineers, Mr. W. J. U. Woolcock, M.P., in the chair.

Mr. Woolcock referred to a comparatively recent development in kinematography—*i.e.*, the production of the industrial film. There were further developments coming. An instance was the ultra-rapid camera, which was now coming into use. It would, he thought, bring us to a further stage, where, it seemed to him that the kinematograph might become a most useful agent in the solution of many scientific problems. Another stage would be reached when the microscope could be fitted to the projector.

The first film shown was the "Winning and Working of Sulphur," lent by Chance & Hunt, Ltd. By means of a clever diagrammatic arrangement the strata in a sulphur well, and its working, were shown with remarkable clearness. General views of the Texas Gulf sulphur works were shown, and the entire process of mining and despatching the sulphur was graphically depicted. It was pointed out that the ground of the steaming field is subsiding at the rate of about ½ in. per diem, that the grab buckets used in the handling of the product are capable of removing 4,000 lb. in one operation, and that the sulphur is loaded on ships of 5,000 tons capacity at the rate of 200 tons per hour. Other operations shown included the discharge of field sulphur pumps into the collecting pump sump, building vats to hold the liquid sulphur in process of freezing, blasting the sulphur into shape for loading by Brownhoists, loading railway trucks and weighing the waggons.

Films on the "Manufacture of Steel—Crucible, Open Hearth, Electric and Bessemer Processes," lent by Mr. W. H. Hatfield, of the Brown-Forth Research Laboratories, Sheffield, and the "Metallurgy of Zinc," a Gaumont production, were then shown.

Mr. A. G. Craig, chairman of the Chemical Industry Club, in proposing a vote of thanks to Mr. Woolcock, the Institute of Mechanical Engineers, and the lenders of the films, appealed to those who were not already members of the club to join.

Mr. E. V. Evans, Chairman of the London Section of the Society of Chemical Industry, seconding the vote of thanks, said he hoped it was not by any means the last time members of his Section and the Chemical Industry Club would unite to see industrial films.

November Trade Returns

Further Improvement in Exports

WHILE not quite so satisfactory as those for the previous month, the Board of Trade Returns for November are by no means discouraging. The position reached in October has been maintained, and if the modest but consistent expansion in exports which has marked the last five months has temporarily slackened, the notable rise recorded in the imports of raw materials would appear to be an indication of better trade in the near future. Compared with October, the imports in the month under review are higher by £4,516,943, but the increase in exports is only £629,463, while re-exports have declined by £562,495. The apparent adverse balance was £16,500,000, against £12,000,000 in the previous month.

Chemicals and Drugs

There was a general increase in the importation of chemicals. Sodium nitrate, which increased by 90,726 cwt. in October, was nearly double the previous month's total, while borax jumped from 2 cwt. to very nearly double the October figure of 1,380 cwt. Detailed figures of the increases are given below with the October figures in parentheses, the amounts being in cwts., unless otherwise stated: Tartaric acid, 709 (702); bleaching materials, 3,919 (2,478); borax, 2,025 (2); calcium carbide, 50,598 (37,688); crude glycerine, 535 (160); red lead, 2,707 (1,303); sodium nitrate, 222,008 (148,138); cream of tartar, 1,300 (900); and zinc oxide, 461 tons (358). The decreases similarly compared are: acetic acid (including acetic anhydride), 156 tons (343); distilled glycerine, 254 (398); potassium nitrate, 7,396 (12,599); and sodium compounds (other than nitrate), 3,843 (9,255).

Decline in Tar Oil and Creosote

Exports of chemicals during November were generally lower than in the previous month. Tar oil, creosote, &c., 804,780 gallons of which we exported in October are phenomenally low at 28,672 gallons, especially when compared with the August total of 3,275,794. Bleaching powder and potassium compounds showed signs of improvement, but sulphate of ammonia, sodium compounds, and zinc oxide were all down. The following figures show in detail the products, the exports of which show increases over the October figures; the latter are given in parentheses, and the amounts are in cwts. unless otherwise stated: ammonia chloride (muriate), 443 tons (356); bleaching powder, 14,276 (8,861); carbolic acid, 6,350 (5,150); naphthalene, 1,456 (892); coal tar products not elsewhere specified, 20,383 (14,201); copper sulphate, 710 tons (442); distilled glycerine, 4,633 (2,885); potassium chromate and bichromate, 2,540 (778); potassium nitrate, British prepared, 970 (867); sodium compounds not elsewhere specified, 61,497 (48,493); and sodium sulphide (including saltcake), 24,381 (24,344). The following show decreases: sulphuric acid, 1,165 (1,533); tartaric acid (including tartrates not elsewhere specified), 518 (878); sulphate of ammonia, 7,408 tons (11,558); benzol and toluol, nil (24 gallons); naphtha, 2,799 gallons (3,411); tar oil, creosote, &c., 28,672 gallons (804,780); crude glycerine, 5 (892); sodium carbonate, 360,583 (379,486); caustic soda, 88,688 (91,852); sodium chromate and bichromate, 2,415 (3,366); and zinc oxide, 53 tons (166).

Dyes and Dyestuffs

The figures indicate an all-round increase in imports of dyes and dyestuffs, chief among which are alizarine and coal tar intermediates. The imports of the latter amounted to 29 cwt. as against 2 cwt. in October, and the other articles similarly compared are: Alizarine, 1,401 cwt. (28); coal tar dyes other than alizarine and synthetic indigo, 1,707 cwt. (1,192); cutch, 4,334 cwt. (1,471); and natural indigo, 17 cwt. (7). There was a decrease of 2,844 cwt. in the export of dyes and dyestuffs during the month, the total being 9,792 cwt. as compared with 12,636.

Imports of painters' colours and materials were less, with the exception of white lead (basic carbonate), the comparative figures being: Barytes, ground, 29,614 cwt. (34,228); white lead, 6,394 cwt. (6,369); and painters' colours, &c., other sorts, 33,600 cwt. (40,421). Exports under this heading, at 76,752 cwt., were 7,157 cwt. less than in the previous month.

Scientific Instruments and Glassware

Scientific, illuminating, optical, &c., glassware was imported to the extent of 45,643 cwt., valued at £149,458, as against 50,438 cwt., to the value of £167,443, imported in October. Exports amounted to 2,209 cwt., of the value of £39,334; the previous month's total was 2,237 cwt., valued at £42,593. During November we imported 76,645 gross of glass bottles and jars, valued at £76,757, and exported 29,137 gross, valued at £47,405.

We imported £20,191 worth of (complete) scientific instruments and appliances (except electrical) during the month, the total being made up as follows: Germany, £5,793; France, £2,305; U.S.A., £8,361; and other countries, £3,732. Exports under the same heading totalled £83,114, the largest individual customer being British India; this was also the case in the previous month.

Coal exports were slightly more at 3,593,864 tons, worth £4,878,019.

Alby United Carbide Factories

IN a circular issued to the shareholders, the directors state that since August 4, 1920, they have enjoyed the advice and assistance of the advisory committee appointed at a meeting held in July, 1920. The committee, after investigations, made certain definite recommendations for a change of control, to which effect was given. Since then several alterations by appointment and resignations have been made in the composition of the board. The board as reconstituted, submitted the position of the company to further careful and minute investigation. The result, it is stated, not only confirmed the committee's view, but showed that the pressing liabilities of the Alby Company and the group of controlled companies were even greater than were at first supposed. The company was overloaded with debt, and had no working capital. The circular deals very fully with the company's position, and the board conclude by stating that they have no alternative but to recommend liquidation, and at an extraordinary general meeting, called for the 22nd inst., a resolution that the company be wound up by the Court will be proposed. Accompanying the circular are the accounts, which show the position of the company at December 31, 1920, the date on which the present board took control, but it is pointed out that the book cost values of the assets shown therein bear no relation to the market values of to-day. It is also pointed out that the company at the end of 1920 had no funds wherewith to carry on business or to meet its very pressing liabilities. The provision of the necessary finance during the last twelve months has been the cause of great anxiety to the board. The total debit balance on profit and loss accounts of the whole group amounted at December 31, 1920, to about £500,000, and almost every asset was pledged to creditors. The liabilities of the company for loans from bankers, &c., amounted at that date to £693,613, not including guarantees. These, as well as other liabilities, have since been reduced by the sale of the shares in the St. Helen's Colliery and Brickworks Co., as well as certain other assets.

Recent Wills

Mr. James Johnstone, analytical chemist, Braehead, 15, Clincarthill Road, Rutherglen, Glasgow ..	£14,113
Mr. William Henry Bates, of Leicester, indiarubber manufacturer	£93,001
Baron Ebury, of Gloucester Place, Portman Square, London, chairman of Van den Berghs, Ltd. (net personalty, £63,714)	£79,289
Mr. George Walker Walker, of Aberdeen, Fellow of Trinity College, Cambridge, and formerly lecturer in physics at the University of Glasgow	£2,646
Mr. William Brewis Van Haansbergen, of Consett, Durham, chairman and managing director of Langdale's Chemical Manure Co., Ltd., and vice-chairman of Lawes' Chemical Manure Co., Ltd. (net personalty £37,584).....	£84,676
Sir Samuel Cleland Davidson, of Sea Court, Bangor, co. Down, founder and chairman of Davidson & Co., Ltd., Belfast.....	£185,817

Society of Public Analysts

AT the ordinary meeting on December 7, held at the Chemical Society's Rooms (Mr. Alfred Smethan in the chair), Certificates were read for the first time in favour of Messrs. John Leonard Lizius, B.Sc., A.I.C., Harry Malkin Mason, M.Sc. (Sheffield), F.I.C., Thomas McLachlan, A.I.C., Charles March Caines, F.I.C., and Girija Nath Mukerjee, B.Sc. (Cal.). Certificates were read for the second time in favour of Messrs. Jack Cecil Drummond, D.Sc.(Lond.), F.I.C., Alfred William Long, John Charles Mallersh, Charles Harold Wright, M.A.(Cantab), F.I.C.

Abstracts of Papers

In a paper on "The Estimation of Small Quantities of Antimony in Copper and Brass," by B. S. Evans, M.C., B.Sc., F.I.C., the author stated that existing methods were unsatisfactory either on the score of length or accuracy, and put forward a process which he claimed to be reasonably rapid and accurate. The method was described in detail, the copper being first eliminated with sodium hypophosphite and the antimony precipitated on copper foil, from which it was dissolved and reprecipitated as the sulphide, and estimated colorimetrically. The chemistry of the process was dealt with, and the factors governing the Reinsch and hypophosphite tests for arsenic were discussed.

"The Inks of Ancient and Modern Egypt" were the subject of a paper by A. Lucas, O.B.E., F.I.C. The author referred to the types of pens used in ancient Egypt and gave an account of the black and coloured inks on ancient papyri and parchments. The chemical reactions of these inks were described, and an analysis was given of a carbon ink of the sixteenth century B.C. The inks in old Arabic and Coptic books were next described, and evidence of the use of iron inks in papyrus MSS. of the seventh century A.D. was adduced. The composition and characteristics of modern Egyptian inks were outlined and analyses of different qualities of carbon inks were given.

In some "Notes on the Analysis and Use of Red Squill in Rat Poisons," by C. L. Claremont, B.Sc., F.I.C., Red Squill (*Urginea Maritama*) was described, a short *résumé* of previous work given, and methods of using it as a raticide explained. The author gave analyses and toxic values of a number of red squill powders, the main feature of which was the presence of a sugar-like substance which served as an indication of the presence of squill, and gave approximate quantitative results, but it did not appear that there was any relationship between this and the toxic value. Similar figures derived from the white squill (B.P.) and Urginea Burkei were also given, and the difficulty of distinguishing red from white squill dealt with.

New British Chemical Standard

THERE is now ready for issue a new steel which is of special value both as a dead mild analytical standard very low in impurities, and also as a pure "iron" sample for standardising bichromate and other volumetric solutions. The analyses have been undertaken as usual by a number of experienced chemists in the United Kingdom and U.S.A representing the following interests:—British Government Department, U.S. Bureau of Standards, referee analysts (independent), railway analysts (representing users issuing specifications), and works analysts (representing makers and users). The standard figures are as follows:—

CARBON STEEL "A 2."

Carbon (combined)	0.039
Silicon	0.036
Sulphur	0.020
Phosphorus	0.008
Manganese	0.043
Arsenic	0.031
Nickel	0.06
Chromium	0.013
Copper	0.065
Oxygen	0.04
Iron (by difference)	99.64

The standard turnings may be obtained in 500, 100 or 50 gramme bottles either direct from organising headquarters, 3, Wilson Street, Middlesbrough; or through any of the leading laboratory furnishers at a price just sufficient to cover the cost. A certificate giving the names of the analysts co-operating, the types of methods used, and a detailed list of the result will be supplied with each bottle.

Glass Technologists' Visit to Bottle Works

ON Wednesday members of the Society of Glass Technology, many of whom had travelled from the provinces to attend the annual meeting of the Society, paid a visit to the Charlton Works of the United Glass Bottle Manufacturers, Ltd. A representative of THE CHEMICAL AGE, who accompanied the party, was informed that the works, when finally completed, will occupy an area of 33 acres. The sand, which is obtained fron local sandpits and from Belgium, is automatically elevated from trucks to a large container, supplies being released as required. Supplies pass through a mixer and are carried along to hoppers above the furnaces by means of elevated electric trolleys. After passing through the furnace, which is gas-heated to a temperature of 1,400°C., the liquid glass is taken up by an Owens automatic machine, which is said to be capable of producing bottles of any size between 1 drachm and ½ gallon, with a maximum production of 180 bottles per minute. When working the machine practically synchronises with a rotating table of liquid glass. Passing over this table a vacuum is automatically produced in cups disposed at intervals around the circumference of the machine, and the liquid is sucked up until the vacuum is again automatically cut off. The supply is separated from the revolving pot by a "knife," which also prevents the liquid from falling out of the cup. As the machine rotates the glass is solidified sufficiently for it to be transferred to a mould, and compressed air, released in the same manner as the vacuum, forces the glass to the required shape. The whole process takes barely ten seconds, and the bottle is released, passing down a chute. It is then ready for the annealing process, which occupies about eight hours.

The fact that scarcely half a dozen members of the party left the works in time to catch the specified train back to London testifies to the interest displayed by the visitors.

The Sale of a Tincture Press

AT Leeds Town Hall, on Monday, before Mr. Justice Salter, W. H. Wharram, Ltd., manufacturing chemists, Lady Lane, Leeds, sued Hall, Forster and Co., Ltd., manufacturing chemists, Elswick Court, Northumberland Street, Newcastle-on-Tyne, claiming £116 damages for alleged breach of contract in respect of non-delivery of a Tangye tincture press. It was stated that in 1920 a Newcastle firm of manufacturing chemists decided to give up business, and sold their premises and plant to a firm, who, not requiring the whole of the machinery, put some of it for sale by auction. About this time the Tangye tincture press, which was part of this machinery, the plaintiffs stated, was sold to them for £80 by Mr. J. W. Bartlett, acting on behalf of the defendants, Mr. Forster having purchased the machine for £45. The defendants were, however, at this time undisclosed principals, and subsequently, Mr. Forster having learnt that the true value of the machine was £250, he decided to retain it, notwithstanding Mr. Bartlett's protests. The plaintiffs began an action against Mr. Bartlett for breach of contract, and he then stated that in selling the press he was acting for the defendants. That action was still pending. Mr. Bartlett, in evidence, said Mr. Forster commissioned him to sell the press, it being arranged that they should divide what was received for the press over £50. For the defence, Mr. Forster denied having authorised Mr. Bartlett to sell the press. His Lordship, giving judgment, said the plaintiffs had failed to satisfy him that Mr. Bartlett was authorised to sell the machine. There would, therefore, be judgment for the defendants, with costs.

North of England Coke Oven Managers

In his presidential address at the meeting of the North of England Coke Oven Managers' Association at Durham on December 12, Mr. A. H. Thwaite referred at some length to the best means of manipulating a by-product coke oven plant during an industrial dispute.

In his opinion, the most economical way of manipulating a plant under lock-out circumstances would be to erect suitably designed gas producers which would be equipped with mechanical means for charging the fuel and discharging the ashes. If these were at hand and the hot coke left in the ovens, the amount of gas necessary to keep the desired number of ovens at a suitable temperature for rapidly restarting would, he thought, be comparatively small. The capital cost for such a plant would doubtless be heavy, but it would appear that it would soon repay its cost.

From Week to Week

Rich DEPOSITS OF CHINA CLAY are reported to have been discovered between Bovey Tracey and Lastleigh, near Dartmoor.

It is announced that the CRUSHING MILL of the Olympia Oil and Cake Co., Ltd., Selby, will be closed for three weeks from to-day (Saturday).

On December 7, members of the Royal College of Science Chemical Society visited the heavy chemical works of Spencer Chapman and Messel, Ltd.

MR. A. F. DABELL read a paper on "Better Production Methods" at a meeting of the Institution of Petroleum Technologists in London on Tuesday.

Damage estimated at £100 was caused by fire recently at the premises of JAMES ROBINSON & CO., LTD., aniline dye manufacturers, of Hillhouse Lane, Huddersfield.

The LIBRARY of the CHEMICAL SOCIETY will be closed for the Christmas Holidays at 1 p.m. on Friday, December 23, and will reopen at 10 a.m. on Thursday, December 29.

The GLASGOW OFFICES of Cookson & Co., Ltd., and the British and Foreign Metal and Chemical Co., Ltd., have been removed to Baltic Chambers, 50, Wellington Street.

A paper on the "Scouring of Cotton Fabrics," by J. HUEBNER, was read yesterday (Friday) at a meeting of the Manchester Section of the Society of Dyers and Colourists.

At an extraordinary meeting of the British Uralite Co. (1908), Ltd., held in London on Wednesday, MR. J. CROSS was elected a director in place of the late Dr. F. W. Passmore.

DERBY & CO., LTD., chemical merchants, announce that their address is now 26-27, Hatton Garden, London, E.C.1. The telephone numbers and telegraphic address remain unchanged.

At a meeting of the Andersonian Chemical Society, held in Glasgow last week, MR. T. C. MITCHELL gave a lecture on "Fermentation." A number of interesting lantern slides were shown.

ALBRIGHT & WILSON, LTD., chemical manufacturers, Oldbury, have subscribed 200 guineas to the special half-million appeal on behalf of the funds of the University of Birmingham.

The Salters' Institute of Industrial Chemistry has awarded forty-seven GRANTS IN AID to chemical assistants, occupied in factory or other laboratories in or near London, to facilitate their further studies.

MR. WALTER S. CORDER, acting under medical advice, has resigned the chairmanship of British Glues and Chemicals, Ltd., but retains his seat on the board. Mr. S. Walton, F.C.A., has been elected chairman.

About 250 workers are out of employment at Perth OWING TO A DISPUTE between J. Pullar & Sons, Ltd., Perth Dye Works, and the Amalgamated Society of Dyers, Bleachers, etc., regarding wages and hours.

It is rumoured that the Badische Anilin and Sodafabrik Co. is about to increase its capital by something approaching 150,000,000 marks in order to repair the damage caused by the recent EXPLOSION AT OPPAU.

Dated December 12, a cable from the British Broken Hill Proprietary Co., Ltd., states that the Adelaide LEAD AND ZINC MILLS have been restarted with two shifts, but there is a shortage of underground men.

MR. E. R. THOMAS, head of the Science Department of Rugby School, and who did valuable work on high explosives during the War, has been appointed headmaster of the Royal Grammar School, Newcastle-on-Tyne.

The accounts of the CHEMICAL INDUSTRY CLUB for the past financial year show a surplus of £84 7s. 8d., as against £77 17s. 6d. in the previous year. Since the recent annual dinner there has been a considerable accession to the membership of the club.

In connexion with the Midland varnish, paint, and colour manufacturing trades, classes for instruction in PAINT AND VARNISH TECHNOLOGY are to be formed, and steps are being taken for the appointment of a lecturer; the proposal at first is to give one lecture per week.

A paper entitled "Researches on Residual Affinity and Co-ordination. Part VII. Cobaltic Lakes of the Alizarin Series," by G. T. Morgan and J. D. Main Smith, was read at a meeting of THE CHEMICAL SOCIETY, held at Burlington House, Piccadilly, London, on Thursday.

A letter dealing with the ECONOMICS OF FREE INDUSTRY in relation to national wealth, in which some forgotten laws are re-stated, appeared in *The Times* on Thursday. The signatories are Sir Hugh Bell, Mr. R. D. Holt, the Rt. Hon. G. Lambert, Dr. W. Ripper, the Rt. Hon. W. Runciman, and Mr. E. J. P. Benn.

In addition to the Bradford Dyers' Association, Ltd., who have associated themselves with the coalowners' application for REDUCED RAILWAY RATES FOR COAL, the Association of Glass Bottle Manufacturers of Great Britain and Ireland, and the North British Bottle Manufacturers Co., Ltd., have taken similar action.

A wedding was solemnised at the University Church, Cambridge, on December 10, between MR. WILLIAM LAWRENCE BRAGG, Fellow of Trinity College, Cambridge, and Professor of Physics at Manchester University, eldest son of Sir William Bragg, and Miss Alice Hopkinson, daughter of Dr. A. Hopkinson, Fellow of Emmanuel College.

Since the announcement on September 14 last of the names of gentlemen appointed to the permanent panel from which Committees, consisting of five persons, are selected from time to time to consider and report upon complaints referred to them by the Board of Trade under Part II. of the Safeguarding of Industries Act, the following ADDITIONAL APPOINTMENTS have been made:—Sir Thomas W. Allen, Mr. F. J. Blakemore, Mr. Frank Moore, Mr. T. H. Ryland, and Provost A. B. Weir.

At a meeting of the Senate of London University on Wednesday, DR. R. H. ADERS PLIMMER was appointed to the University Chair of Chemistry, tenable at St. Thomas's Hospital Medical School, as from January 1 next. As from March 1 next DR. LEWIS SIMONS is appointed to the University Readership in Physics, tenable at Birkbeck College, London. MR. K. G. NAIK, an internal student of the Imperial College, Royal College of Science, was awarded the D.Sc. in Chemistry.

A serious explosion was averted in the laboratory of the Rothamsted Experimental Station, Harpenden, last week by the promptness and courage of MR. FREDERICK TATTERSFIELD, an agricultural chemist. A cylinder containing hydrogen developed excessive heat, setting fire to a portion of the laboratory furniture, and Mr. Tattersfield pulled out the cylinder, carrying it out of doors, where water was poured upon it. He sustained severe burns to the hands in attempting to turn off a leaking tap.

An appeal for £250,000 has been issued by the University Colleges of South Wales and Monmouthshire. Lord Glanely, the President of the College, has subscribed £50,000 (£25,000 for the "Salem" chemical laboratory and £25,000 for agricultural buildings and endowment), and Mr. D. R. Llewellyn, treasurer, has subscribed £20,000. The most urgent need of the college at the moment is the provision of up-to-date fully-equipped laboratories for the teaching of pure science and particularly for the two departments of Physics and Chemistry.

Mr. William M. Cummings, Lecturer in Organic Chemistry at the Royal Technical College, Glasgow, and late of British Dyes, Ltd., delivered an address on PROBLEMS OF DYESTUFFS MANUFACTURE, at a meeting of the Scottish Section of the Society of Dyers and Colourists, held in Glasgow on December 9. It was only by standardising the conditions of manufacture, he said, that we could standardise our colours. In some cases we could equal the German products; but only by standardising the dyestuffs which we were already manufacturing, before proceeding to the manufacture of new dyestuffs, could we hope to meet the competition of the continental manufacturers. He also appealed for the prosecution of intensive research in order to keep abreast of modern developments.

The Heriot-Watt College Committee have had under consideration a letter from the secretary of the University of Edinburgh in regard to a joint application being made to the Miners' Welfare Advisory Committee by the University and the Governors of the Trust for a grant of £25,000 per annum under the Mining Industry Act, 1920, for the establishment, equipment, and maintenance of MINING RESEARCH LABORATORIES. The co-operation of the governors is invited in view of the fact that any mining research hitherto undertaken in Edinburgh had been carried out by Professor Briggs in the Heriot-Watt College, and that the governors already own a site for mining laboratories. The committee recommend the appointment of a sub-committee to meet a sub-committee of the University, with a view to the drafting of a joint application.

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ALCOHOLS. Derivatives of cinnamyl alcohol and phenylallyl alcohol; α-phenylglycerine. C. Moureu and P. Gallagher. *Bull. Soc. Chim.*, November 20, 1921, pp. 1009-1017.

NITRO COMPOUNDS. Ortho and para nitro derivatives of benzyl bromide. C. Moureu and R. Brown. *Bull. Soc. Chim.*, November 20, 1921, pp. 1006-1008.

ELECTRO-CHEMISTRY. Improvements in the electrolytic manufacture of chlorine and caustic soda. Part III. P. Razous. *L'Ind. Chim.*, November, 1921, pp. 440-442.

The reduction of energy expenditure in electrochemical operations. Part I. F. Boitard. *L'Ind. Chim.*, November, 1921, pp. 437-440.

TECHNOLOGY. The production of vacuum in chemical industry. Part VIII. R. Follain. *L'Ind. Chim.*, November, 1921, pp. 435-437.

CARBIDE. The fuel question and the carbide industry. Dilys. *L'Ind. Chim.*, November, 1921, pp. 442-445.

German

ARSENIC COMPOUNDS. Organic arsenic compounds. Part V. The action of cyanogen bromide on phenylated tertiary arsines. W. Steinkopf and G. Schwen. *Ber.*, November 12, 1921, pp. 2791-2801.

Organic arsenic compounds. Part VI. The decomposition of alkylated or arylated arsine-oxybromides. W. Steinkopf and G. Schwen. *Ber.*, November 12, 1921, pp. 2802-2811.

REDUCTION. Reduction of pyridine with zinc dust and acetic anhydride. O. Dimroth and R. Heene. *Ber.*, November 12, 1921, pp. 2934-2942.

BORON COMPOUNDS. Preparation of organic boron compounds by the aid of boron fluoride. Part I. Boron alkyls and alkyl boric acids. E. Krause and R. Nitsche. *Ber.*, November 12, 1921, pp. 2784-2791.

ALDEHYDES. The preparation of aldehydes from acid chlorides. Part IV. Dialdehydes (I.). F. Zetzsche and C. Flütsch. *Ber.*, November 12, 1921, pp. 2888-2893.

Fuchsine-sulphurous acid and its colour reaction with aldehydes. H. Wieland and G. Scheuing. *Ber.*, November 12, 1921, pp. 2527-2555.

REACTIONS. The action of ozone upon aliphatic and aromatic substitution products of ammonia. W. Strecker and M. Baltes. *Ber.*, November 12, 1921, pp. 2693-2708.

The interaction of azo compounds and their salts with aromatic hydrocarbons and aluminium chloride. R. Pummerer and J. Binapfl. *Ber.*, November 12, 1921, pp. 2768-2784.

INDIGO COMPOUNDS. The course of the oxindigo synthesis. K. Fries and H. Hasenjäger. *Ber.*, November 12, 1921, pp. 2931-2934.

Desoxyindigo. W. Borsche and R. Meyer. *Ber.*, November 12, 1921, pp. 2854-2856.

TARS. Lignite tar. S. Ruhemann. *Ber.*, November 12, 1921, pp. 2565-2568.

CARBONIUM COMPOUNDS. The alleged hexa-valency of carbon in carbonium and dye salts. A. Hantzsch. *Ber.*, November 12, 1921, pp. 2569-2572.

The constitution of carbonium salts. A. Hantzsch. *Ber.*, November 12, 1921, pp. 2573-2612.

ANALYSIS. The exactitude of the Dumas method for nitrogen determination in the case of compounds very rich in nitrogen. E. Mohr. *Ber.*, November 12, 1921, pp. 2758-2767.

FATTY ACIDS. The manufacture of fatty acids. H. Voss. *Chem.-Zeit.*, November 24, 1921, pp. 1136-1140.

HYDROXIDES. New theory of the formation of hydroxides, particularly from basic metallic oxides. F. Tiemann. *Chem.-Zeit.*, November 22, 1921, p. 1125.

Miscellaneous

PHYSICAL CONSTANTS. The freezing points of organic substances. Part IV. New experimental determinations. J. Timmermans and J. F. Mattaar. *Bull. Soc. Chim. Belg.*, August-September, 1921, pp. 213-219.

ANALYSIS. The estimation of the volatile matter in coal. G. Delmarcel and E. Mertens. Part I. *Bull. Fed. Ind. Chim. Belg.*, October, 1921, pp. 1-27.

The electrolytic estimation of antimony. H. Angenot. *Bull. Soc. Chim. Belg.*, October, 1921, pp. 268-270.

Gravimetric determination of potassium by the cobalt method. A. Vürtheim. *Rec. Trav. Chim. des Pays-Bas*, September 15, 1921, pp. 593-599.

Patent Literature

Abstracts of Complete Specifications

171,136. Tanning Materials from Waste Sulphite Cellulose Lyes, Process for Obtaining. A. Romer, Heidehofstrasse 15, Stuttgart, Germany, and Deutsch-Koloniale Gerb. & Farbstoff Ges.m.b.H. Karlsruhe-Phemhafen, Baden, Germany. Application date, July 7, 1920.

The process is for obtaining from waste sulphite cellulose lyes a tanning substance which is free from sulphurous acid, alkalies, and sugars. The acids contained in the waste lyes such as sulphurous acid, sulpho-lignic acid, &c., or their unsaturated salts, are converted into saturated salts by means of lime or calcium carbonate, and the solution is mixed with alkali carbonate or silicate to convert the ligno-sulphates into sulpho-lignin-alkali salts and precipitate the lime. The resulting solution is converted into a tanning material by adding an acid such as hydrochloric or sulphuric. In an example the lye is neutralised with milk of lime or calcium carbonate, which also precipitates resinous impurities, filtered, and then fermented by passing through a closed system of fermentation vessels charged with yeast fixed on a carrier. The liquid is thereby freed from sugar and is then treated with alkalies to precipitate the lime as carbonate. The solution is then evaporated and mixed with acid. In an alternative, instead of hydrochloric or sulphuric acid, acid-acting salts of metals used in mineral tanning are employed—*e.g.*, aluminium chloride, iron chloride, or chromium chloride. When the acid or metal chloride is added, the amount should be not materially less than half the quantity theoretically required for converting the ligno-sulphates of alkalies and not materially more than that theoretically required for this conversion. This quantity is readily determined from the quantity of alkali previously used.

171,149. Chromic Sulphate, Manufacture of a Solution of. F. M. Mooney, 17, Sussex Avenue, Montreal, Canada. Application date, August 4, 1920.

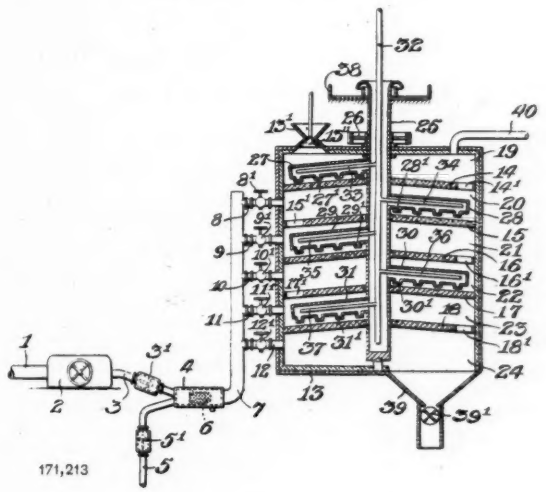
The object is to obtain pure chromic sulphate for tanning purposes from sodium or potassium chromate or bichromate. The potassium chromate or bichromate is converted into chromic acid by means of sulphuric or other acid, and the resulting mixture is cooled to 0°F., when the sodium or potassium sulphate crystallises. The mixture is then run into a centrifugal extractor to separate the crystals, and the solution then passes into a tank where it is saturated with sulphur dioxide obtained by burning sulphur. A solution of chromic sulphate is thus obtained.

171,115. Fertiliser, Production of. W. Broadbridge, 62, London Wall, London, E.C.2, and E. Edser, 3, Hillyfields Crescent, Brockley, London, S.E.4. Application date, August 6, 1920.

The object is to obtain a superphosphate with a high percentage of soluble phosphoric acid from crude phosphatic mineral containing less than 25 per cent. P_2O_5; such low-grade material is normally not suitable for the production of superphosphate. The process is based on the concentration of the crude mineral by means of froth flotation, and the treatment of the concentrate with sulphuric acid. The crude phosphatic material in a wet or dry condition is pulverised to 80 or 100 mesh in a ball or tube mill, and the frothing agent may be added to the water in the mill. Frothing agents such as oleic acid and soap are found to be suitable, and a modifying agent such as sodium silicate is also added to prevent flotation of silica, silicates, ferric oxide, alumina, &c. It is also found advantageous to mix the oleic acid or the like before use with water containing a small proportion of an emulsifying agent such as sodium resinate, sodium oleate, or sodium carbonate. If soap is used as the frothing agent, soft water should be used for the mineral suspension. If a very low-grade mineral is employed the primary concentrate may be reconcentrated by agitation and/or aëration in water containing a small proportion of sodium silicate, but no frothing agent. The froth carrying the concentrate is drained or filtered, and the phosphorite thus obtained is treated with sulphuric acid for the production of superphosphate.

171,213. Distilling Bituminous Sand, Coal, Oil Shale, and other Materials Which Yield Hydrocarbons, Process for. A. E. O'Dell, London. (From the Canadian-American Finance and Trading Co., Ltd., 511, Union Bank Building, Victoria, B.C., Canada.) Application date, August 23, 1920.

The apparatus is more particularly for distilling oil and tar-bearing substances by the direct contact of hot gases obtained by the combustion of gaseous fuel. Gas is supplied through a conduit 5, having an automatic pressure regulating valve 5′, to a burner 4, where it meets a supply of compressed air from a compressor 2. The mixture passes through a catalytic ignition device 6, and the products are delivered through a pipe 7 and branches 8, 9, 10, 11, 12 to the still. The still 13 is provided with grates or porous diaphragms 14, 15, 16, 17, 18, having communicating openings 14′, 15′, 16′, 17′, 18′ alternately at opposite ends of the grates. A hollow vertical shaft 25 carries hollow arms 27, 28, 29, 30, 31 in their respective compartments and each arm is provided with hollow teeth

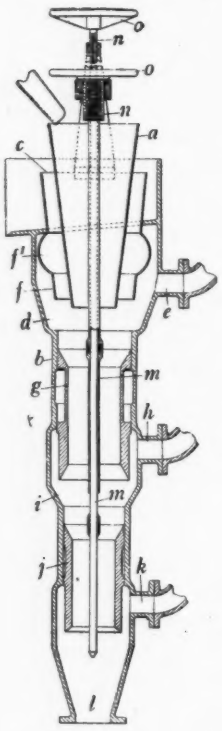


27′, 28′, 29′, 30′, 31′. A pipe 32 is arranged within the shaft 25, and is provided with branch pipes 33, 34, 35, 36, 37, in each hollow arm. Water may thus be circulated through these stirring arms to cool them. The material to be treated is supplied through the inlet valve 13′, and is agitated and gradually transferred from one grate to the next by means of the stirring arms. The material is thus subjected to distillation by the hot gases moving in counter current and the residue is finally discharged through the valve 39′. The volatile hydrocarbons are drawn off through a pipe 40 to a condenser or scrubber where the condensible constituents are separated. The efficiency of the process is increased if the hot distilling gases are at a pressure of 100 to 105 lb. per sq. in.

171,266-7-8. Hydraulic Separators for Minerals or other Solids. E. G. Weddell, Merthyrmawr Road, Bridgend, Glamorgan. Application date, September 24, 1920.

171,266. The apparatus is of the kind in which water flows upwards through a cylindrical chamber, into the upper end of which the material to be treated is supplied. The heavier material falls through to the bottom, and the lighter material is carried upwards by the water and discharged at the top. The raw material is fed into a conical hopper *a* arranged within a larger conical member *c* having an annular enlargement f^1. Water is supplied through the inlet *e* and carries the lighter material upwards through the member *c* while the heavier material passes downwards. The cylindrical bush *g* is arranged below the " sorting chamber " *d* forming a " sorting column," and is of a smaller diameter than the chamber. Another " sorting chamber " *i* and " sorting column " *j* of smaller diameters are arranged below, and water is also supplied through the inlets

h and *k*. The separation of the mineral is improved by the use of the additional "sorting columns." Each member *g* and *j* is connected by a separate stem *m* to a screw *n* and hand wheel *o* so that the capacity of the "sorting chamber" immediately above each column may be varied to suit different working conditions.



171,266

171,267. This apparatus is similar to that described in 171,266. Except that the "sorting columns" are provided with internal helical grooves to produce a swirling movement in the water. The separating action of the apparatus is thereby improved.

171,268. This invention consists in the use of three co-axial "sorting columns" in series with a single outlet at the upper end as illustrated in connexion with 171,266.

171,281. Calcium, Magnesium and Lithium Acetylsalicylates, Manufacture of. Howards & Sons, Ltd., Uphall Works, Ilford, Essex, and J. W. Blagden, Redcourt, Champion Hill, London, S.E. 5. Application date, October 6, 1920.

The object is to avoid the use of organic solvents to precipitate calcium, magnesium, and lithium acetylsalicylates from their aqueous or alcoholic solutions. These compounds are produced by the interaction of the metal carbonate and acetylsalicylic acid in chemically equivalent proportions, in the presence of a little water. Part of the acetylsalicylate is dissolved in the water and the remainder is separated in a solid form and dried. The saturated solution of acetylsalicylate may be used for the next reaction.

171,282. Coal, Process for Testing the Qualities of. Thermal Industrial and Chemical (T.I.C.) Research Co., Ltd., and J. S. Morgan, 52, Grosvenor Gardens, London, S.W.1. Application date, October 6, 1920.

In order to test the gas-producing qualities of coal it is usually subjected to destructive distillation on a small scale, and the gases tested. This method is frequently inaccurate owing to the difficulty of obtaining identical temperature conditions with all the samples of coal. In the present invention the sample of coal is confined in a cage fixed to the end of a rod which is plunged through a seal of molten lead into a bell-shaped vessel immersed in the lead. The coal may thus be subjected to distillation for a definite time at a pre-determined temperature, and the conditions may be accurately reproduced with a different sample of coal. The products of distillation pass to a condenser, and the uncondensed gas passes on to a gas meter.

171,292. Anthraquinone Derivatives, Manufacture and Production of. J. Y. Johnson, London. (From Badische Anilin & Soda Fabrik, Ludwigshafen-on-Rhine, Germany). Application date, October 19, 1920.

The process is for producing anthraquinone derivatives containing at least one aryl-amino group. These compounds are produced by the reaction of an amino-anthraquinone compound containing one or more amino groups, or derivatives substituted in the amino group and/or the anthraquinone nucleus, with a metal arylide in the presence of primary aromatic amino compounds. The metal arylide is produced *in situ* by the reaction of the metal or metal amide, with the aromatic amines present. The yield may be increased by passing a weak oxidising gas such as dry air through the reaction mixture after the first reaction is over so that any hydro-compounds are oxidised. In an example, 1-amino-2-methyl-anthraquinone is dissolved in aniline at 50°C. and powdered sodium amide is then added to the mixture while maintaining an atmosphere of nitrogen. The temperature then rises to 60°-65°C. and the colour changes to an intense green. The mixture is then treated with dilute hydrochloric acid which precipitates the desired compound in violet crystals. Other examples are given in detail in which the sodium amide is replaced by the sodium compound of para toluidine, or by magnesium or aluminium anilide, The compounds obtained are identical with 1 - amino - 2 - methyl - 4-phenyl - amino - anthraquinone, 1 - amino - 2 - methyl -4 - para- -tolyl - amino - anthraquinone, and 1 - amino - 2 - methyl - 4 - phenyl - amino-anthraquinone respectively. Several other examples are also given in which other amino-anthraquinones and other metal arylides are used as the starting materials.

Note.—Abstracts of the following specifications which are now accepted appeared in The Chemical Age when they became open to inspection under the International Convention: 146,871 (Farbwerke vorm. Meister, Lucius & Brüning), relating to mono-azo-dyestuffs, *see* Vol. III., p. 381; 147,118 (N. Grünstein), relating to butyric aldehyde and butyl alcohol from crotonic aldehyde, *see* Vol. III., p. 404; 147,119 (N. Grünstein), relating to aldol from acetaldehyde, *see* Vol. III., p. 404; 147,906-7 (O. Matter), relating to polyvalent alcohols, *see* Vol. III., p. 455; 149,318 (L. Lilienfeld), relating to manufacture of alkali cellulose, *see* Vol. III., p. 543; 149,662 (Verein Chemischer Fabriken in Männheim), relating to manufacture of sulphur dioxide, *see* Vol. III., p. 543; 149,979 (F. Fischer), relating to resinous bodies from phenols and oxygen, *see* Vol. III., p. 569; 154,558 (L. Granger, C. Mariller, and Soc. Anon. d'Exploitation de Procedes Evaporatoires [Système Prache et Bouillon]), relating to distilling mineral oils, alcohol, &c., *see* Vol. IV., p. 195; 161,924 (Farbwerke vorm. Meister, Lucius & Brüning), relating to manufacture of methane, *see* Vol. IV., p. 703; 163,017 (L. Lilienfeld), relating to others of carbohydrates and derivatives, *see* Vol. V., p. 46.

International Specifications not yet Accepted

170,562. Fatty Acids. M. Melamid, 9, Urachstrasse, Freiburg, Breslau, Germany. International Convention date, October 20, 1920. Addition to 169,962.

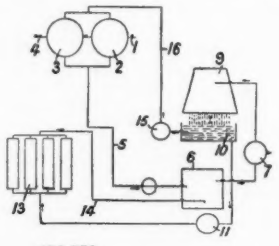
Specification 169,962 (*see* The Chemical Age, Vol. V., p. 709) describes the production of fatty acids by hydrogenating "talloel," the liquid resin produced in the sodium sulphate process of obtaining cellulose from wood. In this invention, the resin is first distilled at ordinary or reduced pressure with superheated steam, and then treated with sulphuric acid and bleaching agents in succession. The product is suitable for oiling textile fibres.

170,563. Glass Manufacture. Westinghouse Lamp Co., Bloomfield, N.J., U.S.A. (Assignees of A. H. Compton, Washington University, St. Louis, Mo., U.S.A.). International Convention date, October 16, 1920.

The glass is intended for use in sodium vapour electric lamps where it is required to withstand the action of alkali metal vapour at 400°-600°C. It consists of sodium oxide, 13 per cent.; aluminium oxide, 15 per cent.; calcium oxide, 12 per cent.; and boron oxide, 60 per cent.

170,572. Gas Manufacture. Koppers Co., Union Arcade Building, Pittsburg, U.S.A. (Assignees of D. L. Jacobson, Union Arcade Building, Pittsburg, U.S.A.) International Convention date, October 22, 1920.

Coke oven gases are passed through scrubbers 2, 3, containing sodium carbonate, to remove carbon dioxide and sulphuretted hydrogen. The liquor is then passed by a pipe 5 to a hot-well 6, and then forced by a pump 7 to a cooling tower 9. The



170,572

liquor is cooled by a current of air which also expels sulphuretted hydrogen, carbon dioxide, and cyanogen compounds. A portion of the purified liquor then passes from the tank

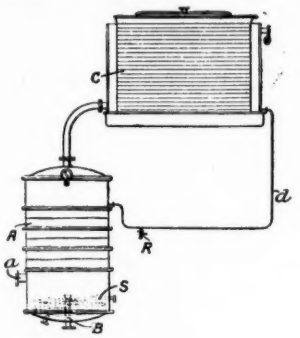
10, through the pump 15, to the scrubbers for use again, and another portion passes through the pump 11 to a heat interchanger 13, in which gas is cooled and the liquor heated. The hot liquor passes by the pipe 14 to the hot well 6.

170,575. Separating Suspended Particles from Gases. Siemens-Schuckertwerke, Siemensstadt, near Berlin. International Convention date, October 22, 1920.

A gas which contains liquid and solid particles in suspension is passed first through an electric precipitator supplied with alternating current, which separates the liquid particles, and then through a precipitator supplied with direct current, which separates the solid particles.

170,591. Wood Distillation. E. Barbet et fils et Cie., 5, Rue de l'Echelle, Paris. International Convention date, October 21, 1920. Addition to 120,560.

The gaseous products of the distillation of wood pass by a pipe *a* into a washer A containing tar, which removes tar from the gas. The gas then passes at a temperature of about 100°C. to a condenser C, in which tar vapour, creosote oils, and acetic acid are condensed. The residual gas at 65°-75°C. then passes through another cooler to remove the remaining condensible constituents. The condensate from the condenser



170,591

C passes by a pipe *d* to the top of the washer A. Methyl alcohol and acetic acid are removed from the tar in the washer A by means of a steam coil S, and the purified tar is discharged through the pipe B. The condenser C may alternatively be kept at about 30°-40°C., at which most of the vapour would be condensed. The quality of the condensate is tested by withdrawing a portion through the valve R.

Latest Notifications.

172,268. Control valve devices for air and gas purifiers. Halbergerhütte Ges. December 1, 1920.
172,269. Purification of blast furnace and like gases. Halbergerhütte Ges. December 1, 1920.
172,270. Dry gas-purifiers. Halbergerhütte Ges. December 1, 1920.
172,272. Process for decolorising liquids. Straatman, J. F. November 30, 1920.
172,280. Coating of photographic films, paper, and so forth. Kino-Film Co. and Münch, C. December 3, 1920.
172,283. Vaporisers for fuel oils. Irinyi, A. November 29, 1920.
172,292. Centrifugal pumps or blowers and similar machines. Beck, W. November 30, 1920.
172,295. Process for the utilisation of bituminous minerals and earths. Tralls, R. November 30, 1920.
172,302. Treatment of carbonaceous and other materials. Frank, F. December 1, 1920.
172,325. Apparatus for preventing the occurrence of higher harmonic currents in the working of metal vapour rectifiers. Akt.-Ges. Brown, Boveri, et Cie. December 6, 1920.
172,329. Safety apparatus for the manipulation of liquids with semi-recuperation of the gaseous fluids. Mauclere, P. A. P. V. December 6, 1920.

Specifications Accepted, with Date of Application

143,525. Metallic ores, Process of treating. J. W. Moffat. April 30, 1918.
148,943. Vertical retorts and gas-producers. H. G. Hennebutte. March 12, 1918.
149,320. Ethers of cellulose or of its conversion products and derivatives, Manufacture of. L. Lilienfeld. August 6, 1919.
150,962. Alkali sulphate and hydrochloric acid, Process and apparatus for the production of. T. Goldschmidt Akt.-Ges. September 9, 1919.
151,988. Distilling and rectifying columns. E. Barbet et Fils et Cie. October 1, 1919.
153,265. Dinitrophenol, Process for the production of. Norsk Hydro Elektrisk Kvaelstofaktieselskab. October 29, 1919.
155,579. Electrolytes for use in electrolytic cells. Metropolitan-Vickers Electrical Co., Ltd. December 9, 1919.
159,887. Electrolytically separating chromium, Process of. E. Liebreich. March 8, 1920.
160,148. Resins, Manufacture of. Barrett Co. March 8, 1920.
163,018. Ethers of carbohydrates having the empirical formula $n(C_6H_{10}O_5)$ such as cellulose, starch, dextrine, and the like. L. Lilienfeld. May 5, 1920.
163,271. Aromatic hydrocarbon mixtures, Process for the production of oily bodies of high boiling point from. L. Lilienfeld. May 10, 1920.
165,759. Phosphoric acid, Process for the manufacture of. W. N. Hirschel and Amsterdamsche Superfosfaatfabriek. June 24, 1920.
165,770. Perylene, Process for the manufacture of. A Zinke. July 2, 1920.
171,661. Products containing ethers of carbohydrates having the empirical formula $n(C_6H_{10}O_5)$, their conversion products and derivatives. L. Lilienfeld. May 15, 1920.
171,722. Zinc or zinc and lead, Process of producing. C. E. Cornelius. May 27, 1920.
171,729. Tanning agents, Manufacture of. A. G. Bloxam. (*Gerb- und Farbstoffwerke H. Renner & Co.*) June 24, 1920.
171,739. Carbon monoxide, Apparatus for the detection and estimation of. A. L. Levy, and R. H. Davis. July 20, 1920.
171,743. Gas under pressure, Apparatus for the production by electrolysis. E. Vesme. July 26, 1920.
171,751. Pure caustic alkalies from impure lyes, Process for the recovery of. K. Heinemann and Hoesch & Co. August 14, 1920.
171,785. Hydrogenating and distilling hydrocarbons from bituminous substances. A. E. O'Dell. (*Canadian American Finance and Trading Company, Ltd.*) Aug. 23, 1920.
171,805. Coal, Plants and processes for the gasification of. Woodall, Duckham & Jones (1920), Ltd., and Sir A. M. Duckham. September 1, 1920.
171,859. Magnetic separators. H. H. Thompson and A. E. Davies. October 8, 1920.
171,884. Gas-producers. J. F. Wells. November 3, 1920.
171,909. Low Temperature distillation of fuel. Merz & McLellan (Firm of), W. T. Bottomley and E. G. Weeks. December 3, 1920.
171,918. Oil shales, Method of treating. S. H. Dolbear. January 4, 1921.

Applications for Patents

Bichowsky, F. von and Harthan, J. Processes of producing titanium-nitrogen compounds. 32,859. December 7.
Chemische Fabrik auf actien vorm. E. Schering, and Carpmael, W. Process for solidifying volatile bodies. 32,768. December 6.
Cunningham, L. B. C. Production of aluminium alloys. 32,800. December 7.
Cunningham, L. B. C. Machine for facilitating welding by the alumino-thermic process. 32,801. December 7.
Elektrizitätswerk Lonza. Manufacture of metaldehyde. 32,586. December 5. (Switzerland, March 3.)
Elektrizitätswerk Lonza and Johnson, J. Y. Manufacture of metaldehyde and obtainment of combustible substances therefrom. 32,704. December 6.
Freeman, N. H. Desulphurising oil. 32,560. December 5.
McIntosh, D. and G. Sulphurising of wool, &c. 32,791. December 7.
Pease & Partners, Ltd., and Wilson, J. Manufacture of silica bricks. 32,996. December 8.
Perkins, W. G. & H. F. K. and Sulman, H. L. Treatment of ores containing oxidised copper compounds. 33,100. December 9.
Siemens-Schuckertwerke. Apparatus for electrically precipitating suspended particles from fluids. December 9. (Germany, January 14, and June 28). 33,151 and 33,171.
Steel Barrel Co., Ltd. Single-acting pumps for volatile liquids. 32,734. December 6.
Yeadon, J. A. System of low-temperature carbonisation. 32,546. December 5.

Patents Court Cases

Applications have been made under Sec. 24 of the Patents and Designs Acts 1907 and 1919, for the following Patents to be indorsed "Licences of Right":—137,831 and 139,171, both in the name of C. A. Braun, and relating to the manufacture of cellulose.

Lowest Gas Prices in the World

At a meeting of the Widnes Town Council on Tuesday, the price of gas was reduced by 6d. per 1,000 cub. ft., making the price for motive power and industrial purposes from 1s. 6d. to 1s. 11d., and for lighting purposes, from 2s. 1d. to 2s. 3d. per 1,000. This reduction makes the Widnes gas prices the lowest in the world.

Monthly Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

British Market Report

Thursday, December 14, 1921.

THE demand for chemicals continues fairly brisk, especially having regard to the approaching stock-taking period. Prices are well maintained.

The export inquiry has been rather better during the past week, and a better volume of trade is reported.

General Chemicals

ACETONE remains in good demand, and the price is higher.

ACID ACETIC is quietly steady; the undertone favours sellers.

ACID CITRIC remains uninteresting although a little export business is reported.

ACID FORMIC.—There has been a certain amount of hand-to-mouth buying; imported stocks are becoming depleted.

ACID OXALIC is quiet, but prices are very firm.

ACID TARTARIC remains a weak market, with little doing.

ARSENIC is unchanged.

BLEACHING POWDER.—The demand is still very unsatisfactory, and makers are still working on very low production.

COPPER SULPHATE remains a slow market, with prices nominally unchanged.

FORMALDEHYDE is in much better inquiry, and as stocks are absorbed the secondhand price is slowly approaching makers' limits.

IRON SULPHATE is unchanged.

LEAD ACETATE.—The market is still very lifeless, and prices are nominal.

LEAD NITRATE is in a very similar position.

LITHOPONE has been in fair inquiry, although the turnover remains very small; the price is firm and unchanged.

POTASSIUM CARBONATE.—Certain substantial sales have been made to Continental destinations, but the market is still badly overstocked.

POTASSIUM CAUSTIC.—Although the price remains steady there is a remarkable absence of demand, and stocks hang fire.

POTASSIUM CHLORATE is unchanged.

POTASSIUM PRUSSIATE.—The general improvement in Continental exchanges has caused this article to firm up in price; supplies are distinctly on the low side.

SODIUM ACETATE is very firm; higher prices are not unlikely.

SODIUM CAUSTIC is much quieter, with makers still sold for some distance ahead.

SODIUM NITRITE is a dull market; prices seem more likely to advance than to recede.

SODIUM PRUSSIATE remains particularly firm, and little is obtainable at present prices for delivery over the first two or three months of next year.

Coal Tar Intermediates

Business during the past week has continued on quiet lines, but there are distinct signs of improvement. More inquiry is about, and buyers are less inclined to hold back than has been the case of late.

ALPHA NAPHTHOL continues uninteresting.

ALPHANAPHTHYLAMINE has been inquired for, but little business is actually passing.

ANILINE OIL AND SALT continue very firm, and a fair business has been done.

BENZIDINE BASE is uninteresting.

BETA NAPHTHOL continues to pass quietly into consumption, at recent figures, though the tendency is slightly weaker.

DIMETHYLANILINE has been inquired for both on home and export account.

DIPHENYLAMINE is very firm, and several good orders have been placed.

"H" ACID.—A fair business has passed.

NITRO BENZOL.—The usual regular orders have been received, but this intermediate continues on the quiet side.

PARANITRANILINE is featureless.

RESORCIN has been inquired for, and is the turn weaker.

Coal Tar Products

In view of the approaching Christmas holidays and the anxiety of many contractors to cover their commitments for this year, there has been a better demand for one or two coal tar products for prompt delivery.

90's BENZOL is obtainable at 2s. 6d. per gallon, both for prompt and forward.

PURE BENZOL is fairly quiet. Supplies continue to be scarce, and the price is about 3s. 6d. per gallon on rails in the Midlands, and 4s. on rails in London.

CREOSOTE OIL is in fairly good demand for prompt delivery, and is worth about 6d. per gallon on rails in the North, and 6¼d. in the South. The forward position is somewhat uncertain, and creosote for the first few months of next year is not worth more than 5¼d. to 5½d. in the North, and 6d. in the South.

CRESYLIC ACID is in poor demand, and orders are few. The pale quality is worth from 2s. 1d. to 2s. 2d. on rails, and the dark quality from 1s. 9d. to 1s. 10d.

SOLVENT NAPHTHA is also inactive, and is worth about 2s. 5d. on rails in the Midlands, and 2s. 10d. to 2s. 11d. in London.

NAPHTHALENE is in poor demand, and there is little business doing.

PITCH.—The market is unchanged.

Sulphate of Ammonia

THERE is no news to report. The demand for export remains satisfactory.

French Market Report

THE market has been comparatively steady, and an increasing volume of business has been transacted. The prices below are per 100 kilos unless stated otherwise:—

ACETONE, 550 frs.
ACID ACETIC, 80 per cent., 350 frs.
ACID BORACIC, 370 frs.
ACID LACTIC, 270 frs.
ACID OXALIC, 415 frs.
ALUM (lump), 100 frs.
ALUM CHROME, 150 frs.
ALUMINA SULPHATE, 14 per cent., 65 frs.
AMMONIA CARBONATE, 220 frs.
BLEACHING POWDER, 80 frs.
BORAX CRYSTALS, 175 frs.
CALCIUM CHLORIDE, 45 frs.
CREAM OF TARTAR, 680 frs.
LEAD ACETATE, 310 frs.
LEAD NITRATE, 375 frs.
NAPHTHALENE FLAKE, 110 frs.
POTASSIUM BICHROMATE, 350 frs.
POTASSIUM PERMANGANATE, 12 frs. per kilo.
POTASSIUM PRUSSIATE, 600 frs.
SODIUM ARSENIATE, 235 frs.
SODIUM BICARBONATE, 50 frs.
SODIUM BICHROMATE, 315 frs.
SODIUM CAUSTIC, 110 frs.
SODIUM HYPOSULPHITE, 85 frs.
SODIUM METABISULPHITE, 150 frs.
SODIUM NITRATE, 330 frs.
SODIUM PHOSPHATE, 120 frs.
SODIUM PRUSSIATE, 350 frs.
SODIUM SILICATE, 40 frs.
SODIUM SULPHIDE, 60 per cent., 175 frs.

German Market Report

With the continued violent fluctuations in the exchange, prices in Germany continue very erratic, and vary from day to day, and the figures noted below can only be taken as nominal. The majority of the works are fully booked, but a considerable number of them are falling behind in the execution of their old orders, due in the main to the shortage of inland transport. The prices quoted below are per kilo unless otherwise stated :—

ACID OXALIC, 60 marks.
ALUM (lump), 12 marks.
ALUM CHROME, 22 marks.
ALUMINA SULPHATE, 14/15 per cent., 6 marks.
AMMONIA BROMIDE, 63 marks.
AMMONIA CARBONATE, 65 marks.
CALCIUM CHLORIDE, 7 marks.
COPPER SULPHATE, 28 marks.
FORMALDEHYDE, 40 marks.
LITHOPONE, 15 marks.
MAGNESIUM CHLORIDE, 7 marks.
POTASSIUM BROMIDE, 55 marks.
POTASSIUM PERMANGANATE, 60 marks.
SODIUM BROMIDE, 60 marks.
SODIUM HYPOSULPHITE, 12 marks.
SODIUM SULPHIDE, 60 per cent., 22 marks.
ZINC CHLORIDE, 15 marks.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	1	10	to	0	2	0
Acetone oil	ton	87	10	0	to	90	0	0
Acetone, pure	ton	87	10	0	to	90	0	0
Acid, Acetic, glacial, 99-100%	ton	52	10	0	to	55	0	0
Acetic, 80% pure	ton	45	0	0	to	48	0	0
Arsenic	ton	95	0	0	to	100	0	0
Boric, cryst.	ton	65	0	0	to	68	0	0
Carbolic, cryst. 39-40%	lb.	0	0	6½	to	0	0	7
Citric	lb.	0	2	4	to	0	2	5
Formic, 80%	ton	65	0	0	to	67	10	0
Gallic, pure	lb.	0	3	10	to	0	4	0
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol.	ton	40	0	0	to	43	0	0
Lactic, 60 vol.	ton	43	0	0	to	45	0	0
Nitric, 80 Tw.	ton	38	0	0	to	40	0	0
Oxalic	lb.	0	0	8	to	0	0	8½
Phosphoric, 1.5	ton	45	0	0	to	47	0	0
Pyrogallic, cryst.	lb.	0	7	6	to	0	7	9
Salicylic, Technical	lb.	0	1	2	to	0	1	3
Salicylic, B.P.	lb.	0	1	5	to	0	1	6
Sulphuric, 92-93%	ton	8	0	0	to	8	10	0
Tannic, commercial	lb.	0	3	0	to	0	3	6
Tartaric	lb	0	1	4	to	0	1	5
Alum, lump	ton	18	0	0	to	18	10	0
Alum, chrome	ton	37	10	0	to	40	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	12	0	0	to	13	0	0
Aluminium, sulphate, 17-18%	ton	15	0	0	to	16	0	0
Ammonia, anhydrous	lb.	0	1	10	to	0	2	0
Ammonia, .880	ton	35	0	0	to	37	0	0
Ammonia, .920	ton	22	0	0	to	24	0	0
Ammonia, carbonate	lb.	0	0	4	to		—	
Ammonia, chloride	ton	60	0	0	to	65	0	0
Ammonia, muriate (galvanisers)	ton	45	0	0	to	47	10	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	90	0	0	to	95	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	0
Amyl acetate	ton	150	0	0	to	160	0	0
Arsenic, white, powdered	ton	42	0	0	to	44	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	15	0	0	to	16	0	0
Nitrate	ton	40	0	0	to	42	0	0
Barium Sulphate, blanc fixe, dry	ton	26	0	0	to	28	0	0
Sulphate, blanc fixe, pulp	ton	16	0	0	to	16	10	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	0
Bleaching powder, 35-37%	ton	14	0	0	to		—	
Borax crystals	ton	31	0	0	to	32	0	0
Calcium acetate, Brown	ton	8	0	0	to	9	0	0
" " Grey	ton	10	0	0	to	11	0	0
Calcium Carbide	ton	22	0	0	to	23	0	0
Chloride	ton	8	10	0	to	9	0	0
Carbon bisulphide	ton	60	0	0	to	62	0	0
Casein, technical	ton	85	0	0	to	90	0	0
Cerium oxalate	lb.	0	3	6	to	0	3	9
Chromium acetate	lb.	0	1	1	to	0	1	3
Cobalt acetate	lb.	0	11	0	to	0	11	6
Oxide, black	lb.	0	10	6	to	0	11	0
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	29	10	0	to	30	10	0
Cream Tartar, 98-100%	ton	125	0	0	to	130	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol.	ton	85	0	0	to	90	0	0
Formusol (Rongalite)	lb.	0	3	9	to	0	4	0
Glauber salts, commercial	ton	5	5	0	to	5	10	0
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	30	0	0	to	35	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	42	10	0	to	45	0	0
Carbonate (White Lead)	ton	44	0	0	to	47	0	0
Nitrate	ton	48	10	0	to	50	10	0
Litharge	ton	35	10	0	to	36	0	0
Lithopone, 30%	ton	26	0	0	to	28	0	0
Magnesium chloride	ton	12	0	0	to	13	0	0
Carbonate, light	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts commercial)	ton	9	10	0	to	10	0	0
Sulphate (Druggists')	ton	15	10	0	to	17	10	0
Manganese, Borate	ton	70	0	0	to	75	0	0
Sulphate	ton	70	0	0	to	75	0	0
Methyl acetone	ton	85	0	0	to	90	0	0
Alcohol, 1% acetone	ton	90	0	0	to	95	0	0
Nickel sulphate, single salt	ton	65	0	0	to	66	0	0
Nickel ammonium sulphate, double salt	ton	67	0	0	to	68	0	0
Potash, Caustic	ton	33	0	0	to	33	10	0
Potassium bichromate	lb.	0	0	7¾	to		—	
Carbonate, 90%	ton	31	0	0	to	33	0	0
Chloride 80%	ton	15	0	0	to	20	0	0
Chlorate	lb.	0	0	6	to	0	0	6½
Meta bisulphite, 50-52%	ton	112	0	0	to	120	0	0
Nitrate, refined	ton	45	0	0	to	47	0	0
Permanganate	lb.	0	0	11	to	0	1	0
Prussiate, red	lb.	0	2	4	to	0	2	6
Prussiate, yellow	lb.	0	1	2½	to	0	1	3
Sulphate, 90%	ton	20	0	0	to	22	0	0
Salammoniac, firsts	cwt.	3	5	0	to		—	
Seconds	cwt.	3	0	0	to		—	
Sodium acetate	ton	26	0	0	to	27	0	0
Arsenate, 45%	ton	45	0	0	to	48	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	0	6	to		—	
Bisulphite, 60-62%	ton	25	0	0	to	27	10	0
Chlorate	lb.	0	0	4¼	to	0	0	4½
Caustic, 70%	ton	24	0	0	to	24	10	0
Caustic, 76%	ton	25	10	0	to	26	0	0
Hydrosulphite, powder, 85%	lb.	0	2	3	to	0	2	6
Hyposulphite, commercial	ton	15	0	0	to	16	0	0
Nitrite, 96-98%	ton	37	10	0	to	40	0	0
Phosphate, crystal	ton	22	10	0	to	23	10	0
Perborate	lb.	0	1	4	to	0	1	6
Prussiate	lb.	0	0	8½	to	0	0	9
Sulphide, crystals	ton	15	0	0	to	17	0	0
Sulphide, solid, 60-62%	ton	24	10	0	to	25	10	0
Sulphite, cryst.	ton	15	0	0	to	16	0	0
Strontium carbonate	ton	80	0	0	to	85	10	0
Strontium Nitrate	ton	70	0	0	to	72	10	0
Strontium Sulphate, white	ton	7	10	0	to	8	10	0
Sulphur chloride	ton	41	0	0	to	42	0	0
Sulphur, Flowers	ton	13	0	0	to	14	0	0
Roll	ton	13	0	0	to	14	0	0
Tartar emetic	lb.	0	1	6	to	0	1	7
Tin perchloride, 33%	lb.	0	1	2	to	0	1	4
Tin perchloride, solid	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals)	lb.	0	1	5	to	0	1	6
Zinc chloride, 102 Tw.	ton	21	0	0	to	22	10	0
Chloride, solid, 96-98%	ton	35	0	0	to	40	0	0
Oxide, 99%	ton	36	0	0	to	37	0	0
Dust, 90%	ton	47	10	0	to	50	0	0
Sulphate	ton	21	10	0	to	22	10	0

Coal Tar Intermediates, &c.

	Per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	3	0	to	0	3	3
Alphanaphthol, refined	lb.	0	3	6	to	0	3	9
Alphanaphthylamine	lb.	0	2	3	to	0	2	6
Aniline oil, drums extra	lb.	0	1	5	to	0	1	6
Aniline salts	lb.	0	1	6	to	0	1	7
Anthracene, 40-50%	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine)	lb.	0	3	9	to	0	4	3
Benzidine, base	lb.	0	5	6	to	0	6	0
Benzidine, sulphate	lb.	0	5	6	to	0	6	0
Benzoic acid	lb.	0	2	0	to	0	2	3
Benzoate of soda	lb.	0	1	9	to	0	2	0

	Per	£	s.	d.		£	s.	d.
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	5	9	to	0	6	0
Betanaphthol	lb.	0	2	0	to	0	2	2
Betanaphthylamine, technical	lb.	0	7	0	to	0	7	3
Croceine Acid, 100% basis	lb.	0	3	9	to	0	4	0
Dichlorbenzol	lb.	0	0	9	to	0	0	10
Diethylaniline	lb.	0	6	9	to	0	7	0
Dinitrobenzol	lb.	0	1	5	to	0	1	6
Dinitrochlorbenzol	lb.	0	1	4	to	0	1	5
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	3	9	to	0	4	0
Diphenylamine	lb.	0	4	6	to	0	4	9
H-Acid	lb.	0	7	6	to	0	8	0
Metaphenylenediamine	lb.	0	5	6	to	0	5	9
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	6	6	to	0	7	0
Monosulphonic Acid (2.7)	lb.	0	7	0	to	0	7	6
Naphthionic acid, crude	lb.	0	4	0	to	0	4	3
Naphthionate of Soda	lb.	0	4	3	to	0	4	6
Naphthylamin-di-sulphonic-acid	lb.	0	4	9	to	0	5	0
Nitronaphthalene	lb.	0	1	4	to	0	1	5
Nitrotoluol	lb	0	1	3	to	0	1	4
Orthoamidophenol, base	lb.	0	15	0	to	0	18	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Orthotoluidine	lb.	0	2	3	to	0	2	6
Orthonitrotoluol	lb.	0	0	10	to	0	1	0
Para-amidophenol, base	lb.	0	11	0	to	0	11	6
Para-amidophenol, hydrochlor	lb.	0	11	6	to	0	12	0
Paradichlorbenzol	lb.	0	0	7	to	0	0	8
Paranitraniline	lb.	0	4	6	to	0	4	9
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	12	0	to	0	13	0
Paratoluidine	lb.	0	7	0	to	0	7	6
Phthalic anhydride	lb.	0	3	9	to	0	4	0
Resorcin, technical	lb.	0	5	6	to	0	6	0
Resorcin, pure	lb.	0	7	9	to	0	8	0
Salol	lb.	0	2	4	to	0	2	6
Sulphanilic acid, crude	lb.	0	1	4	to	0	1	6
Tolidine, base	lb.	0	6	6	to	0	7	0
Tolidine, mixture	lb.	0	2	6	to	0	2	9

Metals and Ferro Alloys

The following prices are furnished by Messrs. Miles, Mole & Co. Ltd., 101, Leadenhall Street, London, E.C. 3:—

	Per	£	s.	d.		£	s.	d.
Aluminium, 98-99%	ton	120	0	0	to		—	
Antimony, English	ton	34	0	0	to	37	0	0
Copper, Best Selected	ton	68	0	0	to	69	0	0
Ferro-Chrome, 4-6%	ton	25	0	0	to	26	0	0
Ferro-Chrome Manganese, loose	ton	15	0	0	to	16	0	0
Silicon, 45-50%	ton	12	0	0	to	13	0	0
Tungsten, 75-80%	lb.	0	1	6	to	0	1	8
Lead Ingots	ton	26	0	0	to	27	0	0
Lead Sheets	ton	34	0	0	to	35	0	0
Nickel, 98-99%	ton	190	0	0	to		—	
Tin, English	ton	167	0	0	to		—	
Spelter	ton	26	0	0	to	27	0	0

Structural Steel

	Per	£	s.	d.		£	s.	d.
Angles and Tees	ton	10	0	0	to	11	0	0
Flats and Rounds	ton	10	0	0	to	11	0	0
Joists	ton	10	0	0	to	11	0	0
Plates	ton	11	0	0	to	12	0	0
Rails, heavy	ton	10	0	0	to	11	0	0
Sheets, 24 Gauge	ton	14	0	0	to	15	0	0
Galvanised Corrd. Sheets	ton	17	0	0	to	18	0	0
Zinc Sheets	ton	34	0	0	to	35	0	0

West Cumberland Chemists' Association

WITH a view to creating a local organisation to arrange lectures and discussions, to provide for the acquisition and dissemination of useful information, and to afford opportunities for intercourse amongst its members, a body known as the West Cumberland Association of Chemists, Chemical, and Metallurgical Engineers has been formed under the presidency of Mr. A. B. Coles, F.C.S. The other officers are: Messrs. G. J. Valentine (vice-president), H. Hoy, T. Mann, W. Wilkinson (members of the council), S. Holmes, C. Carlisle (auditors), G. J. Denbigh (hon. treasurer), and D. Wattleworth (hon. secretary). The secretary's address is Windsor Lodge, Moresby, near Whitehaven. A syllabus of meetings, to be held at the Technical College, Workington, has been issued for the 1921-2 session. It is announced that the Association already has a membership of eighty.

Affairs of Metallic Chemicals, Limited

UNDER the compulsory winding-up order made against Metallic Chemicals, Ltd., 11-12, Finsbury Square, London, E.C., in April last, Mr. G. D. Pepys, Official Receiver, has issued a summary of the company's statement of affairs, together with a report on the failure. The liabilities are stated at £39,745, of which £20,465 is due to debenture-holders, and a deficiency in assets of £24,779 is disclosed. As regards shareholders there is an additional deficiency of £98,160, making a total deficiency of £122,939. The Official Receiver states that the company was formed in December, 1917, to carry into effect an agreement with the Holywell Standard Chemicals, Ltd., for the acquisition of certain processes for making zinc oxide, zinc sulphate, lithopone, blanc fixe, &c., with the benefit of all specifications, and to manufacture and deal in chemicals, acids, and minerals. The company acquired freehold works at Burry Port, S. Wales, called the Pembrey Copper Works. It is stated that owing to delay in obtaining the essential plant, the proposed programme of manufacture was upset. The design and erection of the plant, which was completed in 1919, appear to have been unsatisfactory, and subsequently it was found that the cost of manufacture was prohibitive owing to the absence of labour-saving devices. In December, 1920, a receiver for the debenture-holders was appointed, and the Official Receiver is informed that steps are now being taken to offer the company's property for sale by auction. According to a balance-sheet prepared as at June 30, 1920, the expenditure on property and buildings amounted to £27,469; and plant and machinery £34,235. The Official Receiver is acting as liquidator.

Explosives Used in 1920

TABLES compiled from returns furnished to the inspectors by mine and quarry owners in the United Kingdom, show the amounts of the various kinds of explosives used and the number of shots and methods of firing them at mines under the Coal and Metalliferous Mines Regulation Acts, and at quarries under the Quarries Act, in 1920. The total quantity of permitted explosives used in coal mines in 1920 was 13,562,018 lb.; and the total other than permitted explosives 15,596,562 lb.; 1,584,326 lb. of explosives were used in metalliferous mines, and 4,403,032 lb. in quarries, making a total of 35,145,938 lb. at mines and quarries. About 47 per cent. of the weight of explosives used at mines under the Coal Mines Act was of permitted explosives. Gunpowder constituted about 37 per cent. of the total weight of explosives used at mines and quarries. Of permitted explosives the following quantities were used: Ammonite No. 1, 358,513 lb.; Bellite No. 1, 894,967 lb.; Bobbinite, 816,388 lb.; Denaby powder, 502,958 lb.; Dynobel No. 3, 1,960,095 lb.; Dynobel No. 4, 162,170 lb.; Expedite, 200,424 lb.; Kentite, 765,145 lb.; Monarkite, 534,085 lb.; Rea powder, 1,131,464 lb.; Roburite No. 4, 641,676 lb.; Samsonite No. 3, 649,032 lb.; Stomonal No. 1, 606,709 lb.; Stomonal No. 2, 191,421 lb.; Super-Cliffite No. 2, 334,628 lb.; Super-Excellite, 585,408 lb.; Thames powder No. 2, 759,861 lb.; Viking powder No. 1, 447,913 lb.; Viking powder No. 2, 1,469,600 lb.

Norwegian Fish Oil

DURING recent years several improved methods of manufacturing medicinal fish oil have been evolved in Norway, and it is thought that Norway may take a still more prominent place as a world supplier of this oil than has hitherto been the case. It is understood, however, that foreign interests, especially British and American, are behind these developments, which include the erection of large up-to-date factories. For example, a New York firm is stated to have acquired control of most of the fish oil factories in Lofoten, and it is suggested by Norwegian chemists and other technical men that the government should interfere and promote legislation with a view to preventing this penetration by foreign firms into an industry which is, or should be, so essentially Norwegian. At present about one-fourth of the trade is in foreign hands.

Just recently, a new chemical works has been established in Lura, the headquarters of the sales organisation of the Norwegian fish oil factories, about twenty in number, and a research department will be attached to the new works. Further extensions are planned, and the present output of these new works is 20 tons per week. A German chemist has been appointed to take charge of the laboratory.

Company News

ELECTRO-BLEACH AND BY-PRODUCTS, LTD.—An interim dividend of 3½ per cent. on the preference shares is announced on account of the current year.

MINERALS SEPARATION, LTD.—The profits for the year 1920 were £16,629, and £16,260 was brought forward. The total of £32,889 is carried to the balance-sheet.

UNITED INDIGO AND CHEMICAL CO., LTD.—An interim dividend at the rate of 5 per cent. less tax, payable on the preference and ordinary shares, is announced.

CAPE COPPER CO., LTD.—The annual meeting will be held at 9, Queen Street Place, London, on December 21, at 2.30 p.m. The transfer books are closed from December 14 to 21 inclusive.

NATIONAL DRUG AND CHEMICAL CO. OF CANADA, LTD.—The transfer books for the 6 per cent. cumulative first preference shares will be closed from December 18 to 31, both days inclusive.

BRITISH COTTON AND WOOL DYERS' ASSOCIATION.—The transfer registers of the first mortgage debenture stock will be closed from December 19 to 31 inclusive, for preparation of interest warrants.

A. AND F. PEARS.—The transfer books of the debenture stock, preference shares, and preferred ordinary shares are closed from to-day to December 31 inclusive, for the purpose of preparing interest and dividend warrants.

BRITISH BURMAH PETROLEUM CO., LTD.—The transfer books of the 6 per cent. first mortgage debenture stock will be closed from to-day (Saturday) to December 31, for the preparation of interest warrants payable on the latter date.

CENTRAL CORNWALL CHINA CLAY CO., LTD.—The second ordinary general meeting will be held at Winchester House, Old Broad Street, London, E.C., on December 23, at 11 a.m. A proposal to issue a debenture for £25,000 will be put before the meeting.

CASSEL CYANIDE CO., LTD.—The report states that the net profit, including the amount brought in, is £82,178, and after payment of the interim dividend, £58,678 remains. The directors recommend a final dividend of 8d. per share, leaving to be carried forward, £11,678.

AGUAS BLANCAS NITRATE CO., LTD.—The directors announce an interim dividend in respect of the year 1921 on both the preference and ordinary shares of 20 per cent. (1s. per share), less tax at 6s. in the £. Warrants will be posted on December 21 to holders on the registers on December 9.

ZINC CORPORATION.—The directors consider it advisable to pay off the arrears of the fixed preferential dividend due on July 1 last as early as possible, and, as the earnings from the treatment of the tailings dumps are sufficient, they have declared a dividend of 2s. per share on the preference shares, being the first half of the fixed preferential dividend of 20 per cent. for the year 1921, payable on February 1 next, less tax.

ALBY UNITED CARBIDE FACTORIES, LTD.—The balance-sheet, dated December 31, 1920, shows that the loss for the year ended on that date was £140,659. The balance brought forward after paying the preference dividend for the half-year ended June 30, 1920, was £29,271. This sum deducted from the above deficit leaves a debit balance of £111,388. A circular intimating that a proposal to place the company in liquidation appears on another page.

HUELVA COPPER AND SULPHUR MINES.—After deducting £961 for repairs to buildings, £514 for exchange, £7,128 for depreciation on buildings, plant, &c., £709 for replacement of rolling stock, £1,736 for loss on sale of War Stock, and writing off £9,224 for development, the accounts for the year to June 30 last show a profit of £20,601. From this must be deducted a debit balance of £8,114 brought in, leaving a credit balance of £12,487 to be carried forward. The board have decided to write off the balance outstanding against the capital reorganisation account (£27,898) out of the balance of depreciation account, reducing the latter to £16,287.

EGYPTIAN SALT AND SODA CO., LTD.—The report for the year to August 31 last states that the gross profit was £E132,332, less general administration expenses £E5,545, interest on debentures £E2,904, leaving £E123,883. Depreciation of factories absorbed £E11,175, and provision for eventualities £E5,000, leaving £E107,708, *plus* £E115,520 brought in, making £E223,229. Payment of a dividend of 4s. 6d. per share and transferring to reserve to meet expenditure towards completion of Moharrem Bey works, £E60,000, leave to be carried forward, £E54,025. As announced in THE CHEMICAL AGE last week, the annual meeting will be held at Alexandria, on December 23.

BLEACHERS' ASSOCIATION, LTD.—The report for the half-year ended September 30 states that the net profit amounted to £137,871 (as compared with £576,404 last year). The sum of £90,000 (against £115,000) has been transferred to depreciation funds, and after making provision for the interim preference dividends to September 30, there is a loss of £20,121. The credit balance brought forward was £337,890, which, after deducting the above loss, leaves available £317,769. The directors, after taking into account the poor results obtained, have decided to reduce the interim dividend as compared with the last two years from 4 per cent. (actual) to 2½ per cent. (actual), leaving £258,492 to be carried forward.

EAST INDIA DISTILLERIES AND SUGAR FACTORIES.—The directors regret, owing to the late arrival of accounts from India, that they will be unable to submit the audited accounts for the year ended September 30 last within the statutory limit. A proposal will be made at the meeting now called to adjourn to a convenient date in the New Year. Meanwhile, the directors state the result of the year's working, after paying interest on and providing for redemption of debenture stock, will show a satisfactory margin of profit, and they recommend a distribution on the preference shares of 3½ per cent., payable on January 1 next, completing the payment to September 30 last. They have decided to await, as last year, the completion of the London audit before making a recommendation as regards a dividend on the ordinary shares. The meeting will be held at 54, Old Broad Street, London, E.C., on December 20.

SULPHIDE CORPORATION, LTD.—The directors announce a dividend of 5 per cent. on the preference shares (payable out of the profit earned during the year ended June 30) on January 6 next. The transfer books for these shares are closed from December 15 to 31. The report for the year to June 30 last states that the year has been one of much anxiety owing to the prolongation of the Broken Hill strike, and to the award given by Mr. Justice Edmunds, to whom the matters in dispute had been referred. Mining and milling operations were recommenced about the end of November, 1920. Operations at the mine and smelting works have resulted in a working profit of £2,480. This working profit has been augmented by sundry credit items in the profit and loss account, due mainly to successful trading in lead and to interest and profit on investments, the final net result being a profit of £30,009. The annual meeting will be held at Winchester House, London, E.C., on December 22, at noon.

NIGER CO., LTD.—The transfer books for the 8 per cent. seven-year-old notes are closed from December 12 to 20, both days inclusive. At an extraordinary general meeting of the Niger Co. held on Wednesday at Cannon Street Hotel to consider a resolution to convert 3,000,000 of the unissued preference shares of the company into 10 per cent. non-cumulative preference shares of £1 each, ranking both as to dividend and capital below the rest of the preference shares, instead of, as at present, rateably with these, a resolution to this effect was passed after a poll.

Tariff Changes

EGYPT.—A revised list of import tariff valuations on certain non-ferrous metals, with effect from November 1 to December 31, 1921, or until denunciation, was published in the Board of Trade *Journal* (December 8, p. 610).

FEDERATED MALAY STATES.—As from October 21 last petroleum is liable to a Customs import duty of 10 cents per gallon.

BELGIUM.—Restrictions on the export of alcohol and yeast are raised as from December 2.

DENMARK.—A revised Customs import duty of 40 öre per kilog. on acetic acid and vinegar exceeding more than 10 per cent. acid, operates as from November 26 last. This duty will be effective until the new Tariff Law comes into force, and in any case not later than April 1 next. Liquid acetic acid for technical use may be imported duty free when treated according to rules fixed by the Customs authorities.

ITALY.—For the first half of December the price for certificates for the payment of Customs duties is reduced to 469 lire for 100 lire gold, *i.e.*, the surcharge when the duties are paid in paper is 369 per cent.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Partnerships Dissolved

DALE, Robert Morland, and BASKETT, Herbert Fritz Charles, chemical and dye merchants, 34, Finsbury Square, London, E.C. 2, under the style of Mordale & Co., by mutual consent, as from October 3, 1921. Debts received and paid by R. M. Dale, who will continue the business.

FOX, Richard Anstice, FOX, William Poole, and FELTHAM, Edward, oil and colour merchants, Little George Street, Bristol, under the style of Francis F. Fox & Co., as from June 30, 1920, as far as concerns E. Feltham, who has retired from the firm. Debts received and paid by R. A. Fox and W. P. Fox, who will continue the business.

JACKSON, Samuel, and BUTTERWORTH, John, oil refiners and manufacturing chemists, College Street, Rochdale, under the style of Samuel Jackson & Co., and as boiler composition manufacturers at College Street, Rochdale, and Albert Street Works, Rochdale, under the style of the Economic Boiler Composition Co., and as coopers at Clarke's Cooperage, Acker Street, Rochdale, under the style of Clarke's Cooperage, by mutual consent as from December 9, 1921. Debts received and paid by S. Jackson, who will continue the businesses.

LEWIS, Clara, and WOOLLEY, Joseph, druggists, 2, Watery Lane, Birmingham, under the style of Rogers' Drug Stores, by mutual consent, as from December 1, 1921.

Company Winding Up Voluntarily

NOBLES DRUG STORES, LTD., P. S. Booth, 26-28, Kimberley House, 14-17, Holborn Viaduct, London, E.C.1, appointed liquidator (with a committee of inspection), October 31, 1921.

Notice of Dividend

SWITHENBANK, Harold, 132, Beeches Road, West Bromwich, Staffordshire, analytical chemist. Amount per £, 1s., fourth payable, December 19, 1921. Official Receiver's Office, Ruskin Chambers, 191, Corporation Street, Birmingham.

Deed of Arrangement

ROBIE, Allan Vincent, John Street, Huddersfield, and The Portlands, Lindley, Huddersfield, dyeware merchant. Trustee, T. E. Gardner, 2, Darley Street, Bradford. Filed, December 2. Secured creditors, £117; liabilities unsecured, £1,848; assets less secured claims, £492. The following are creditors: Conway, W. G., London, £334; Barnett, A. J., London, £26; Cotter & Co., Belfast, £47; Dufton, W., & Co., Bradford, £163; Allan, J. B., Glasgow, £232; Hanson, J H., Golcar, £29; Hirst, Smailes, & Downey, Huddersfield, £60; Huddersfield Road Transport Co., Huddersfield, £22; Hirst, A. B., & Hirst & Smailes, Huddersfield, £26; Anglo Globe Express Co., Liverpool, £117; Taylor, Fred, & Co., Manchester, £102; Bradburn, C. A., Manchester, £25; Kabbur, K. H., & Co., Manchester, £56; Calvert Dyes, Ltd., Mirfield, £20; West Riding Chemical Co., Mirfield, £30; Graesser Monsanto Chemical Co., Ltd., Ruabon, £500.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

JONES, Harry P. (and wife), 350A, Dewsbury Road, Leeds, chemist. £12 2s. October 19.

NEWMAN, A. Pointon, 51, Thompson Street, Barry Dock, chemist. £11 8s. 11d. October 17.

SARKES, Barnett, 27, Phillip Street, Back Church Lane, dyer and cleaner, £15 19s. October 19.

Mortgages and Charges

*[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.]*

CATALYTIC CHEMICAL CO., LTD., Southall. Registered November 30. £10,000 debentures (filed under sect. 93 (3) of the Companies (Consolidation) Act 1908), present issue £9,000; general charge.

CHEMICALS & BY-PRODUCTS, LTD., Watford. Registered December 2, £13,000 (not ex.) mortgage, to Lloyds Bank, Ltd. *£8,747 16s. 10d. January 7, 1921.

HEATHS (LIVERPOOL), LTD., chemists. Registered November 26, charge, to Bank of Liverpool & Martins, Ltd., securing all moneys due or to become due to the bank; charged on 105, 107, and 109, Whitefield Road, and 2 and 2A, Rothwell Street, Everton. *———— June 15, 1921.

JOHNSON & SONS (MANUFACTURING CHEMISTS), LTD., London, E.C. Registered December 3, £565 12s. 6d. mortgage, to E. A. Gowring, Grittleton, clerk in orders; charged on close of land at Hendon. *£69,650. June 14, 1921.

LEVER BROTHERS, LTD., Port Sunlight, soap manufacturers. Registered November 28, charge under Land Transfer Acts by way of additional or collateral security to Trust Deed registered April 13, 1921, securing all moneys due or to become due under Trust Deed; charged on land and buildings at Victoria Embankment, E.C.; also registered November 30, Trust Deed dated November 16, 1921, and charge under Land Transfer Acts as additional security (supplemental to Trust Deed registered April 13, 1921), securing all moneys due or to become due under original Trust Deed; charged on De Keysers Royal Hotel, Victoria Embankment, E.C., and a part of Watergate House, Water Street, London. *£15,000,000 debenture stock (partly paid). May 6, 1921.

OXLEY'S (J. C.) DYES & CHEMICALS, LTD. (late Oxley & Hird, Ltd.), Dewsbury. Registered November 24, £2,500 mortgage, to Miss C. S. Butterfield, Elmsleigh, Boroughbridge Road, Knaresborough, and others. *£300. January 14, 1921.

SAPON SOAPS, LTD., London, E.C. Registered November 29, £6,000 second debenture, to Earl of Denbigh, Lutterworth; general charge. *Nil. January 5, 1921.

SOUTH AFRICAN CARBIDE & BY-PRODUCTS CO., LTD., London, E.C. Registered December 5, £5,000 debentures; general charge. *Nil. January 13, 1921.

WINSOR & NEWTON, LTD., London, W., artists' colour manufacturers, &c. Registered November 30, mortgage and charge under Land Transfer Acts securing £12,000 to Prudential Assurance Co., Ltd., 142, Holborn Bars, E.C. *Nil. July 13, 1921.

New Companies Registered

The following list has been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C.2:—

ANGLO-FRENCH PHOSPHATE CO., LTD. (Public Company).—Dealers, exporters, and importers of phosphate, carbonate of lime, guano, nitrate, and any other similar substance or products. A subscriber: E. Burleigh, 3, Lloyd's Avenue, E.C. 3. Nominal capital, £187,500 in 750,000 shares of 5s. each.

JOHN METCALF CHEMICAL CO., LTD., Moorfield Chemical Works, Altham, near Accrington.—Chemical manufacturers. Nominal capital, £6,000 in 600 shares of £10.

POMERANTZ'S DRUG STORES, LTD., 85, Roman Road, Bow, London, E. 3. Nominal capital, £1,000 in 1,000 shares of £1 each.

VICTOR BLAGDEN & CO., LTD., Coronation House, 4, Lloyd's Avenue, E.C. 3.—Chemical merchants and manufacturers. Nominal capital, £125,000 in 125,000 shares of £1 each. Directors: V. Blagden, 48, Upper Grosvenor Street, W. 1; E. T. Viousseux, Woodbury, Clay Hill, Enfield; R. R. Wilkins, The Cecils, Chigwell.